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THE ARCHITECTURAL QUARTERLY OF HARVARD UNIVERSITY

MARCH MDCCCXII

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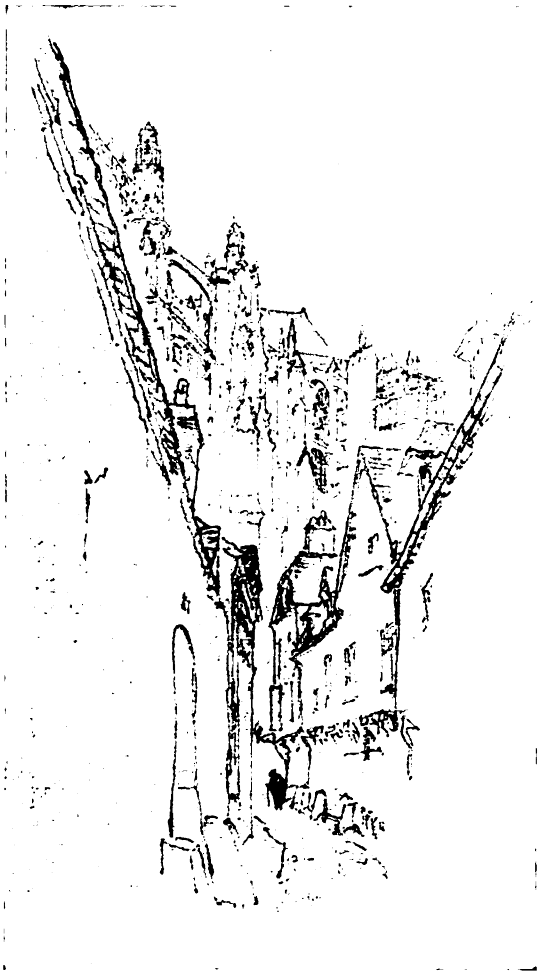
THE ARCHITECTURAL QUARTERLY OF HARVARD UNIVERSITY

THE School of Architecture of Harvard University is undertaking the publication of this professional periodical, to be known as THE ARCHITECTURAL QUARTERLY OF HARVARD UNIVERSITY, primarily to serve as the medium for the publication in permanent form of work which seems likely to prove of general interest to architects, accomplished by past or present members of the School. It is believed that such a publication will prove to be of real value to practitioners and to students of architecture, while it will enable the architectural profession, past students and other friends of the School, to keep in touch with its work and to make that work more widely known. The Harvard School will thus be enabled to extend its usefulness in some degree over a wider area. THE ARCHITECTURAL QUARTERLY will publish designs and drawings by students of the School, important lectures delivered before them, contributions by members of the teaching staff and by former students, and essays written by students as part of the required work in various courses given in the School, when, as not infrequently happens, this work is of such excellence as to be of more or less permanent or general professional interest. Such essays have in the past sometimes found publication in the pages of *The American Architect* or *The American Journal of Archæology*. It is believed, however, that to friends of the School the interest in these essays would be increased by bringing them together into a publication representing the School of Architecture of Harvard University. Such a publication will give also to members of the teaching staff the opportunity to summarize important points in their teaching for the benefit of their students and others, or to treat from time to time certain aspects of their work with greater fullness or from special points of view.

The illustrations in the present number are largely devoted to the work of the Travelling Fellowships in Architecture. Two travelling fellowships have been founded open to competition among graduates of the School of Architecture at Harvard. Of these the Nelson Robinson Jr. Travelling Fellowship was established from the Nelson Robinson Jr. Memorial Fund by vote of the President and Fellows of Harvard College. The Julia Amory Appleton Fellowship was founded during his lifetime by Mr. Charles F. McKim, the architect, in memory of his wife. These fellowships are offered for competition in alternate years and each has an income of $1000 a year, enabling the holders to spend two years in travel and study in Europe. In addition to the *envois* usually required of holders of other similar travelling fellowships in architecture, and which remain the property of the school, each Fellow has also to submit on his return a written thesis, fully illustrated by drawings, embodying original study of some important monuments or groups of monuments. The article published in this number on "The Medieval Town Halls of Italy" is the Fellowship Thesis of Mr. H. E. Warren, S. M. in Architecture '05, who held the Appleton Fellowship from 1905 to 1907.

The Architectural Quarterly does not regard the publication of news relating to the School of Architecture or to its past students as a part of its function, interesting as that might be to a limited number of readers; nor does it propose to publish announcements of the School nor comments on current work or current events. It will limit itself to the publication of such work as it regards as of serious professional interest.



BEAUVAIS CATHEDRAL
A summer sketch
SYDNEY FISKE KIMBALL 3G.S.
A.B. summa cum laude '09

ARCHITECTURAL ACOUSTICS: THE CORRECTION OF ACOUSTICAL DIFFICULTIES

WALLACE C. SABINE A.M., S.D.
PROFESSOR OF PHYSICS, AND LECTURER ON ARCHITECTURAL ACOUSTICS

ON the completion of the Fogg Art Museum in 1895, I was requested by the Corporation of Harvard University to investigate the subject of architectural acoustics with the end in view of correcting the lecture room which had been found impracticable and abandoned as unusable. Later the planning of a new home for the Boston Symphony Orchestra in Boston widened the scope of the inquiry. Since then, over questions raised first by one building and then another, the subject has been under constant investigation.

In 1900 a series of articles embodying the work of the first five years and dealing with the subject of reverberation, was published in the *American Architect* and the *Engineering Record.* The next five years were devoted to the extension of this study over the range of the musical scale and the results were published in the Proceedings of the American Academy of Arts and Sciences in 1906. Since then the investigation has been with reference to interference and resonance, the effects of peculiarities of form, and the causes of variation in audibility in different parts of an auditorium. These results will be published in another article during the ensuing year.

The progress of this experimental investigation has been guided in practical channels and greatly enriched by the experience gained from frequent consultation by architects, either for purposes of correcting completed buildings or in the preparation of plans in advance of construction. Reserving for a later article the stimulating subject of advance planning, the present article is devoted to the problems involved in the correction of completed buildings. It is illustrated by a few examples which are especially typical. I desire to take this opportunity of expressing my appreciation of the very cordial permission to use this material given by the architects, Messrs. McKim, Mead & White, Messrs. Carrère & Hastings, Messrs. Cram, Goodhue & Ferguson, and Messrs. Allen & Collens—to these and to the other architects whose confidence in this work has rendered an extensive experience possible.

The practical execution of this work of correction has recently been placed on a firmer basis by Mr. C. M. Swan, a former graduate student in the University and an associate in this work, who has taken charge of a department in the H. W. Johns-Manville Company. I am under obligations to him and to this company for some of the illustrations used below, and to the company, not merely for having placed at my disposal their materials and technical experience, but also for having borne the expense of some recent investigations looking toward the development of improved materials, with entire privilege of my making free publication of scientific results.

It is proposed to discuss here only such corrective methods as can be employed without extensive alterations in form. It is not proposed to discuss changes of dimension, changes in the position of the wall surfaces or changes in ceiling height. It is the purpose to discuss here medicinal rather than surgical methods. Such treatment properly planned and executed, while not always available, will in the great majority of cases result in an entire remedy of the difficulty.

Two old, but now nearly abandoned devices for remedying acoustical difficulties are stretched wires and sounding boards. The first is without value, the second is of some value, generally slight, though occasionally a perceptible factor in the final result. The stretching of wires is a method which has long been employed, and its disfiguring relics in many churches and court rooms proclaim a difficulty which they are powerless to relieve. Like many other traditions, it has been abandoned but slowly. The fact that it was wholly without either foundation of reason or defense of argument made it difficult to answer or to meet. The device, devoid on the one hand of scientific foundation, and on the other of successful experience, has taken varied forms in its application. Apparently it is a matter of no moment where the wires are stretched or in what amount. There are theatres and churches in Boston and New York in which four or five wires are stretched across the middle of the room; in other auditoriums miles on miles of wire have been stretched; in both it is equally without effect. In no case can one obtain more than a qualified approval, and the most earnest nega-

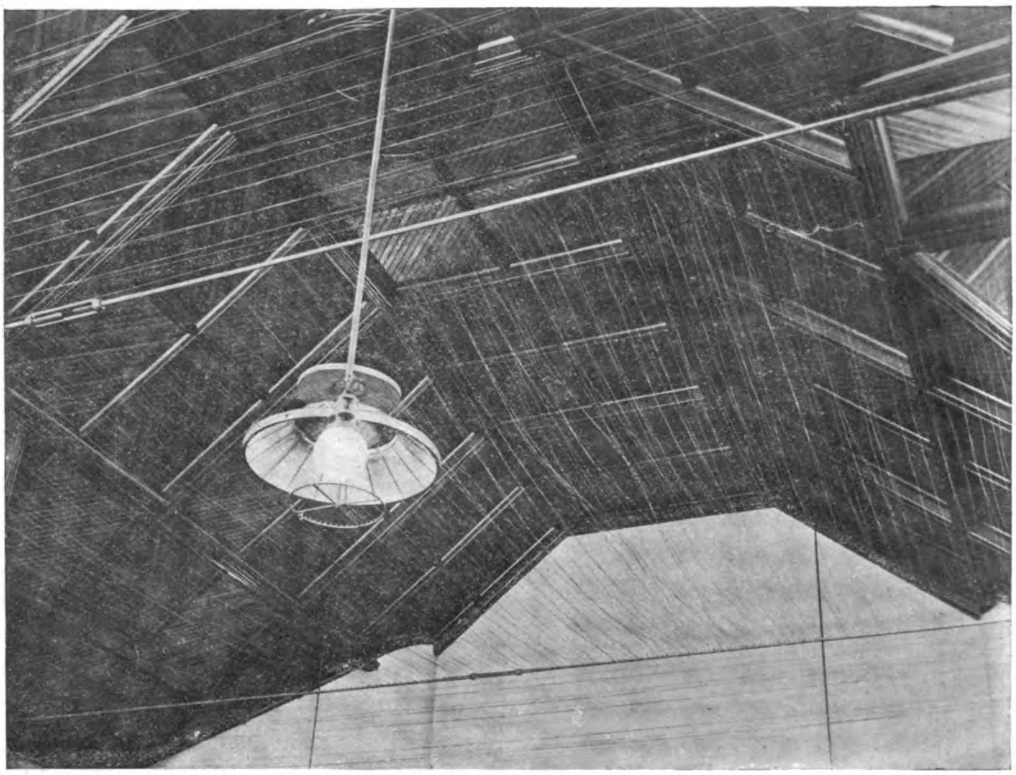


FIG. 1. CEILING OF CHURCH, SAN JOSÉ, CALIFORNIA
SHOWING AN INEFFECTIVE USE OF STRETCHED WIRES

tives come where the wires have been used in the largest amount. Occasionally the response to inquiries is that "the wires may have done some good but certainly not much," and in general when even that qualified approval is given the installation of the wires was accompanied by some other changes of form or occupancy to which the credit should be given. How extensive an endeavor is sometimes made in the use of stretched wires is shown by the accompanying illustration which shows a small section of the ceiling of a church in San José, California. In this church between one and two miles of wire have been stretched with resulting disfigurement, and wholly without avail. The question is being taken up again by the church for renewed effort.

Aside from such cumulative evidence of ineffectiveness, it is not difficult to show that there is no physical basis for the device. The sound, whose echoes these wires are presumed to absorb, scarcely affects the wires, giving to them a vibration which at most is of microscopical magnitude. If the string of a violin were free from the body of the violin, if the string of a piano were free from the sounding board, if the string of a harp did not touch the thin sounding board which faces its slender back, when plucked they would not emit a sound which could be heard four feet away. The sound which comes from each of these instruments is communicated to the air by the vibration of its special sounding board. The string itself cuts through the air with but the slightest communication of motion. Conversely when the sound is in the room and the string at rest the vibrating air flows past it, to and fro, without disturbing it, and consequently without itself being affected by reaction either for better or worse.

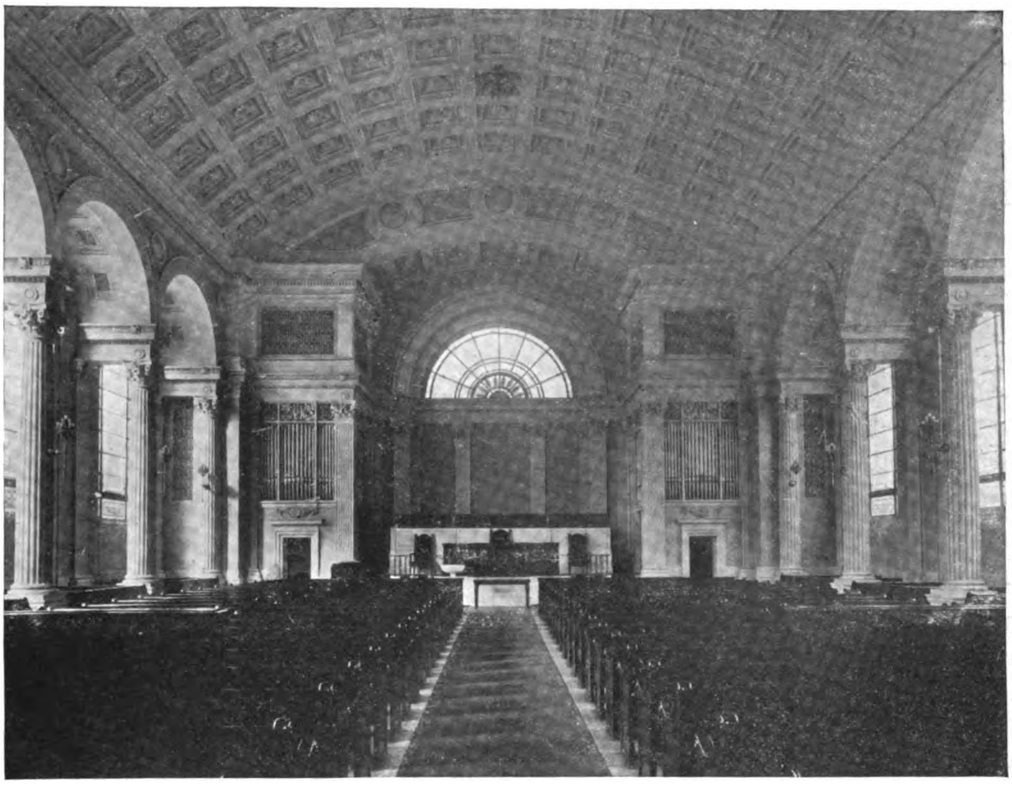


FIG. 2. CONGREGATIONAL CHURCH, NAUGATUCK, CONNECTICUT
McKim, Mead & White, Architects.

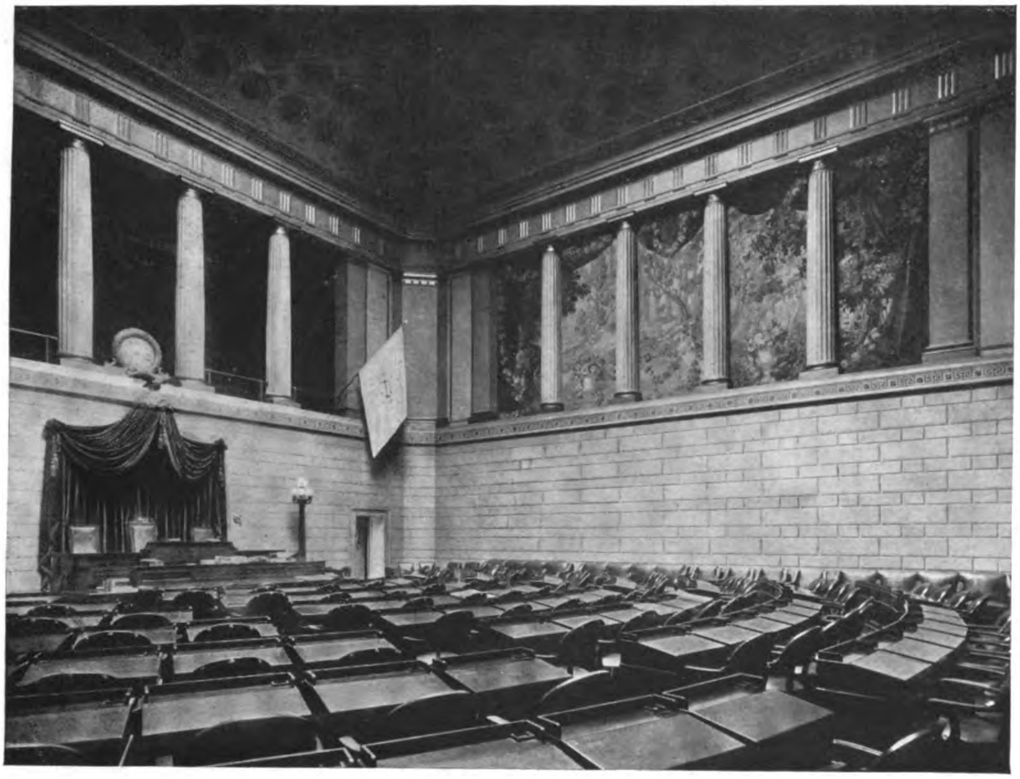


FIG. 3. HALL OF THE HOUSE OF REPRESENTATIVES, RHODE ISLAND STATE CAPITOL

McKim, Mead & White, Architects.

The sounding board as a device for correcting acoustical difficulties has at times a value; but unless the sounding board is to be a large one, the benefit to be expected from its installation may be greatly over-rated. As this particular subject calls for a line of argument very different from that of the main body of the present paper, it will be reserved for a discussion elsewhere, where, space permitting, it can be illustrated by examples of various forms accompanied by photographs and by a more or less exhaustive discussion of their relative merits.

The auditorium in whose special behalf this investigation started seventeen years ago was the lecture room of the Fogg Art Museum. Although this room was in a large measure remedied, it will not be taken as an example. Its peculiarities of shape were such that its complete relief was inherently a complicated process. While this case was chronologically the first, it is thus not suitable for an opening illustration.

Among a number of interesting problems in advance of construction the firm of McKim, Mead & White has brought some interesting problems in correction, of which three will serve admirably as examples because of their unusual directness. The first is that of the Congregational Church in Naugatuck, Connecticut, shown in the accompanying illustration. When built its ceiling was cylindrical, as now, but smooth. Its curvature was such as to focus a voice from the platform upon the audience—not at a point, but along a focal line, for a cylindrical mirror is astigmatic. The difficulty was evident with the speaking, but may be described more effectually with reference to the singing. The position of the choir was behind the preacher and across the main axis of the church.

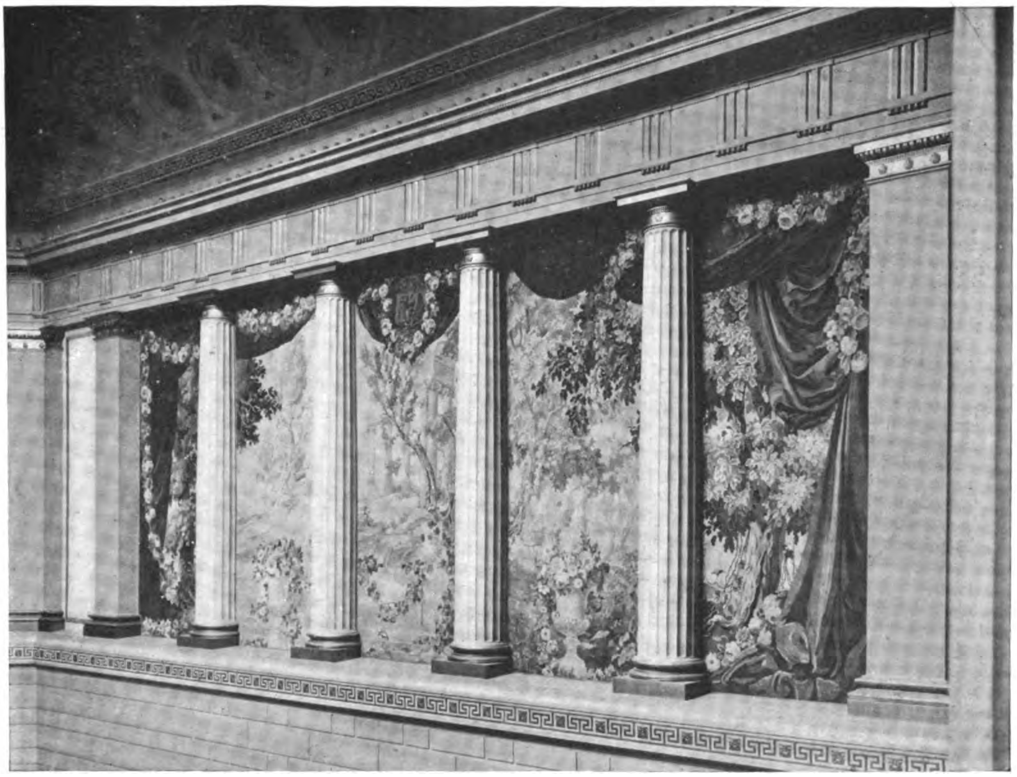


FIG. 4. DETAIL, HALL OF THE HOUSE OF REPRESENTATIVES, RHODE ISLAND STATE CAPITOL

McKim, Mead & White, Architects.

On one line in the audience, crossing the church obliquely from right to left, the soprano voice could be heard coming even more sharply from the ceiling than directly from the singer. The alto starting nearer the axis of the church had for its focus a line crossing the church less obliquely. The phenomena was similar for the tenor and the bass voices, but with focal lines crossing the church obliquely in opposite directions. The difficulty was in a very large measure remedied by coffering the ceiling, as shown in the illustration, both the old and the new ceiling being of plaster. Ideally a larger and deeper coffering was desirable, but the solution as shown was practical and the result satisfactory.

The hall of the House of Representatives in the Rhode Island State Capitol illustrated another type of difficulty. In considering this hall it is necessary to bear in mind that the problem is an essentially different one from that of a church or lecture room. In these the speaking is from a raised platform and a fixed position. In a legislative assembly the speaking is in the main from the floor, and may be from any part of the floor; the speaker stands on a level with his fellow-members; he stands with his back to a part of the audience, and often with his back to the greater part of his audience; in different parts of the house the speaker directs his voice in different directions, and against different wall surfaces. In this hall the walls were of stone to approximately half the height of the room; above that they were of stone and plaster. The ceiling was, as shown, coffered. The difficulty in this room was with that part of the voice which, crossing the room transversely, fell on the side walls. With the speaker standing on the floor, the greater volume of his voice was directed upward. The sound striking the side wall was reflected across the room to the opposite wall and back again, to and fro, mounting gradually until it reached the ceiling. It was there reflected directly down upon the audience. The ceiling sloped, and had some curvature, but the curvature was not such as to produce a distinct focusing of the sound. During these reflections the sound met only feebly absorbent surfaces and therefore returned to the audience with but little loss of intensity. Its return was at such an interval of time as to result in great confusion of speech. Only the fact that the voice, rising at different angles, travelled different paths and therefore returned at varying intervals, prevented the formation of a distinct echo.

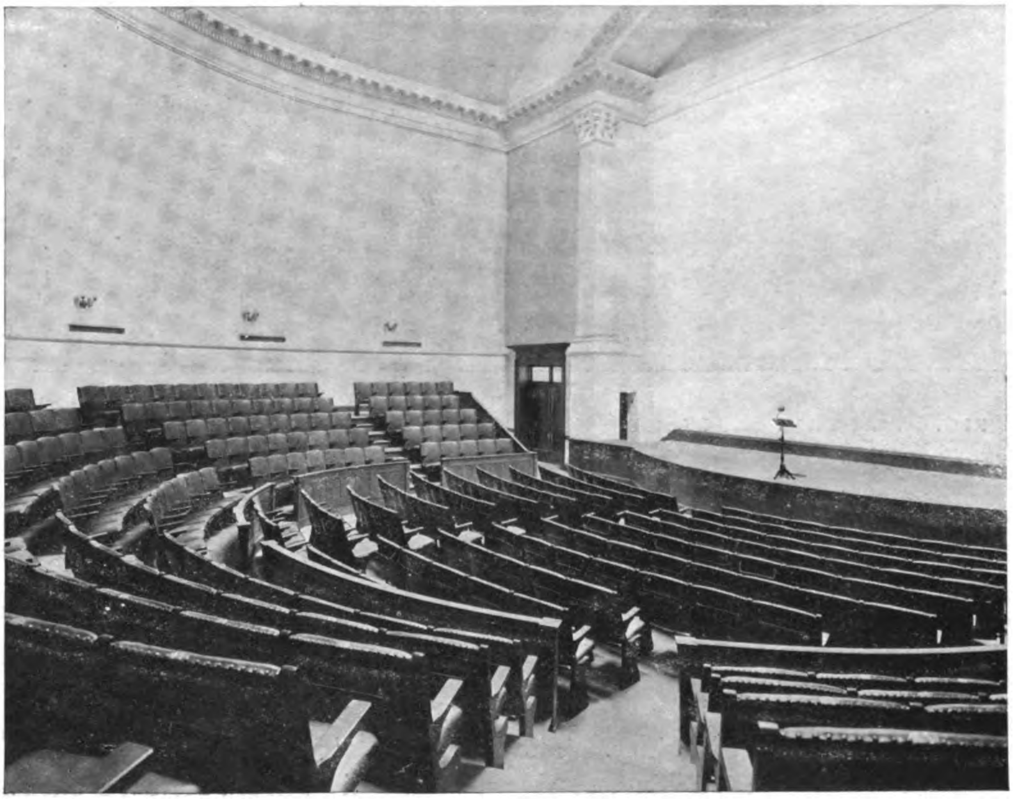


FIG. 5. LECTURE ROOM, METROPOLITAN MUSEUM OF ART
McKim, Mead & White, Architects.

The difficulty was remedied in this case by a change in material without change of form, by diminishing the reflecting power of the two side walls. This was done by placing a suitable felt on the plaster walls between the engaged columns, and covering it with a decorated tapestry. Fortunately the design of the room admitted of a charming execution of this treatment. It is interesting to note that this treatment applied to the lower half of the walls would not have been acoustically effective.

The Lecture Room of the Metropolitan Museum of Art illustrates the next step in complexity. This hall is a semi-circular auditorium, with the semi-circle slightly continued by short, straight walls. As shown in the illustrations the platform is nearly, though not wholly, within a broad but shallow recess. The body of the auditorium is surmounted by a spherical ceiling with short cylindrical extension following the straight side walls. In the centre of the ceiling is a flat skylight of glass. In this room the reverberation was not merely excessive, but it resolved itself by focussing into a multiple echo, the components of which followed each other with great rapidity but were distinctly separable. The number distinguishable varied in different parts of the hall. Seven were distinguishable at certain parts. A detailed discussion of this is not appropriate in the present paper as it concerns rather the subject of calculation in advance of construction. To improve the acoustics the ceiling was coffered, the limiting depth and dimensions of this coffering being determined in large measure by the dimensions of the skylight. The semicircular wall at the rear of the auditorium was transformed into panels which were filled with felt over which was stretched burlap as shown in the second illustration. The result was the result assured—the reduction of the disturbance to a single and highly localized echo. This echo is audible only in the central seats—two or three seats at a time—and moves about as the speaker moves, but in symetrically opposite direction. Despite this residual effect, and it should be noted that this residual effect was predicted, the result is highly satisfactory to Dr. Edward Robinson, the Director of the Museum, and the room is now used with comfort, whereas it had been for a year abandoned.

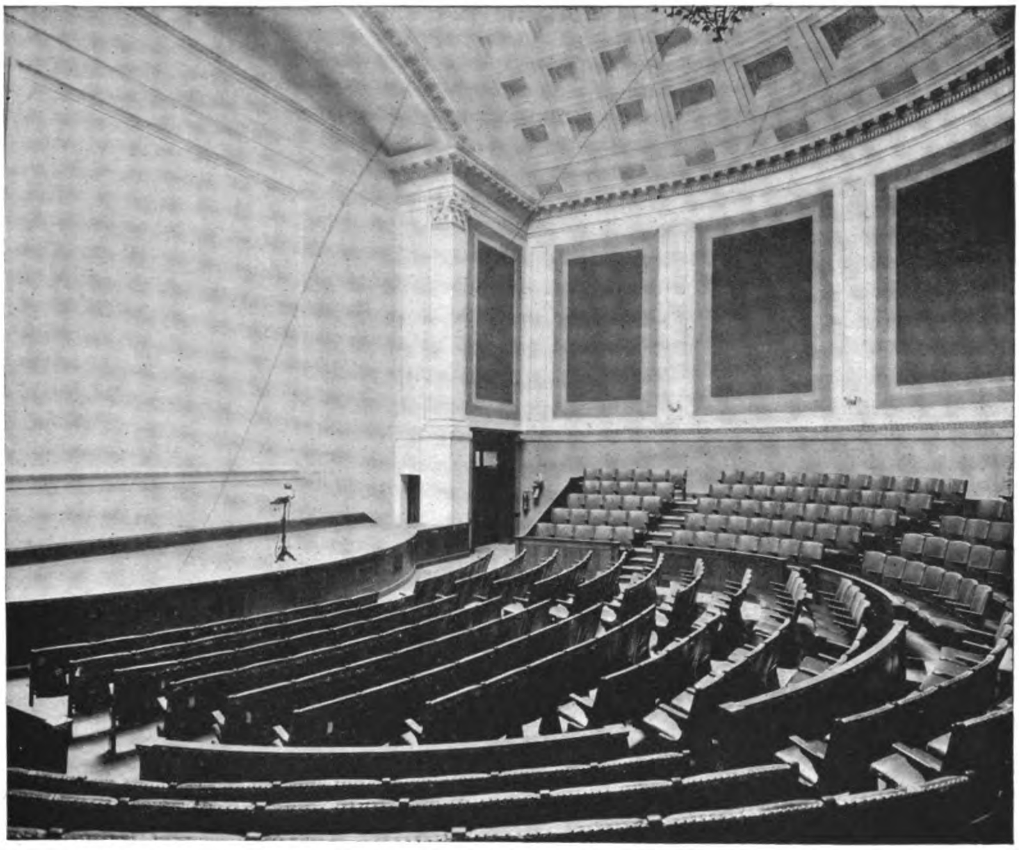


FIG. 6. LECTURE ROOM, METROPOLITAN MUSEUM OF ART
McKim, Mead & White, Architects.

It should be borne in mind that "perfect acoustics" does not mean the total elimination of reverberation, even were that possible. Loudness and reverberation are almost, though not quite, proportional qualities. The result to be sought is a balance between the two qualities, dependent on the size of the auditorium and the use to which it is to be applied.

Geometrically the foregoing cases are comparatively simple. In each case the room is a simple space bounded by plane, cylindrical or spherical surfaces, and these surfaces simply arranged with reference to each other. The simplicity of these cases is obvious. The complexity of other cases is not always patent, or when patent it is not obvious to a merely casual inspection how best the prob-

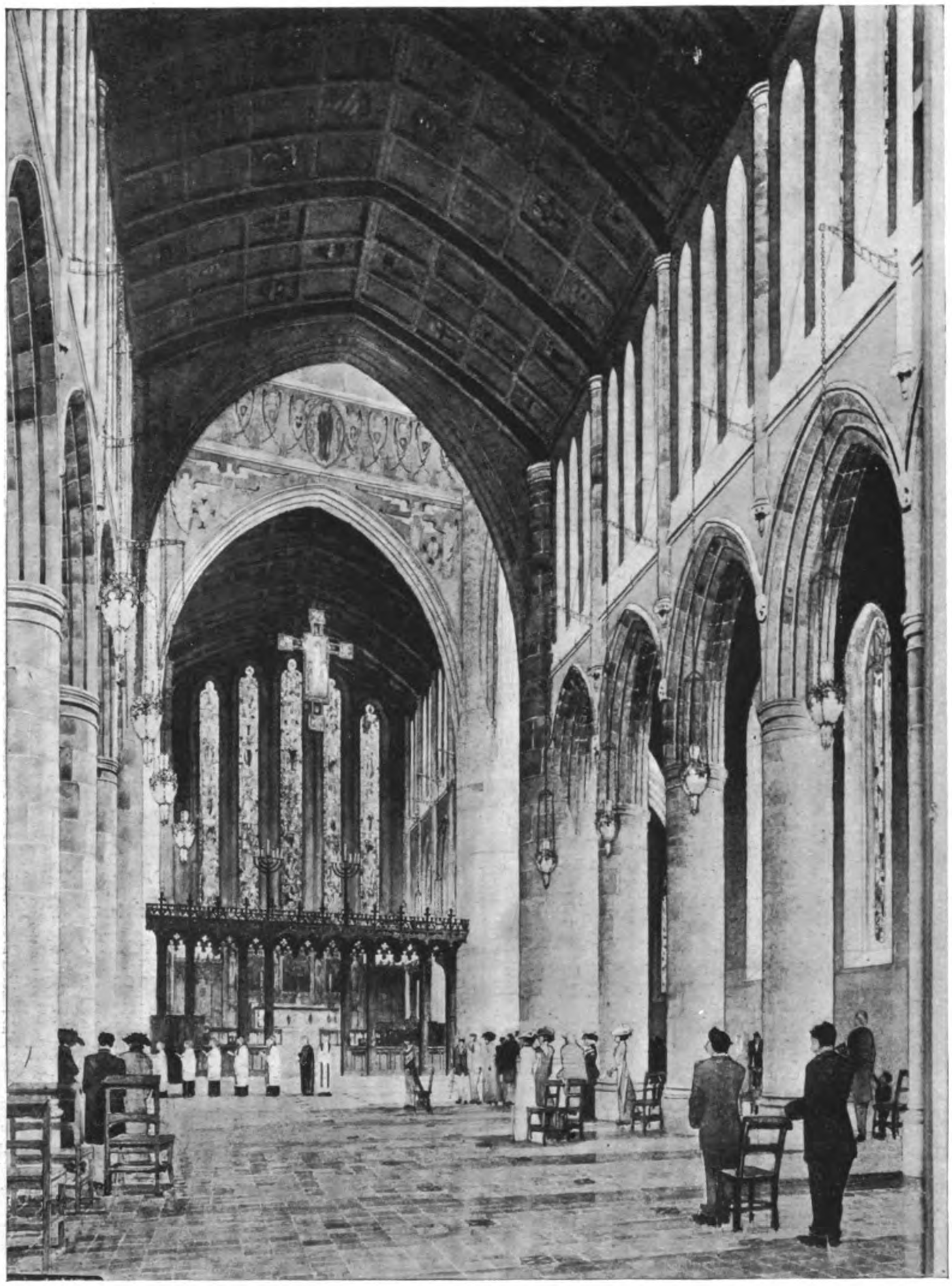


FIG. 7. DESIGN FOR ST. PAUL'S CATHEDRAL, DETROIT
Cram, Goodhue & Ferguson, Architects.

lem should be attacked. A large number of cases, however, may be handled in a practical manner by regarding them as connecting spaces, each with its own reverberation and pouring sound into and receiving sound from the others. An obvious case of this is the theatre, where the aggregate acoustical property is dependent on the space behind the proscenium arch in which the speaker stands, as well as on the space in front of it. In another sense and to a less degree the cathedral with its chancel, transept and nave may be regarded as a case of con-

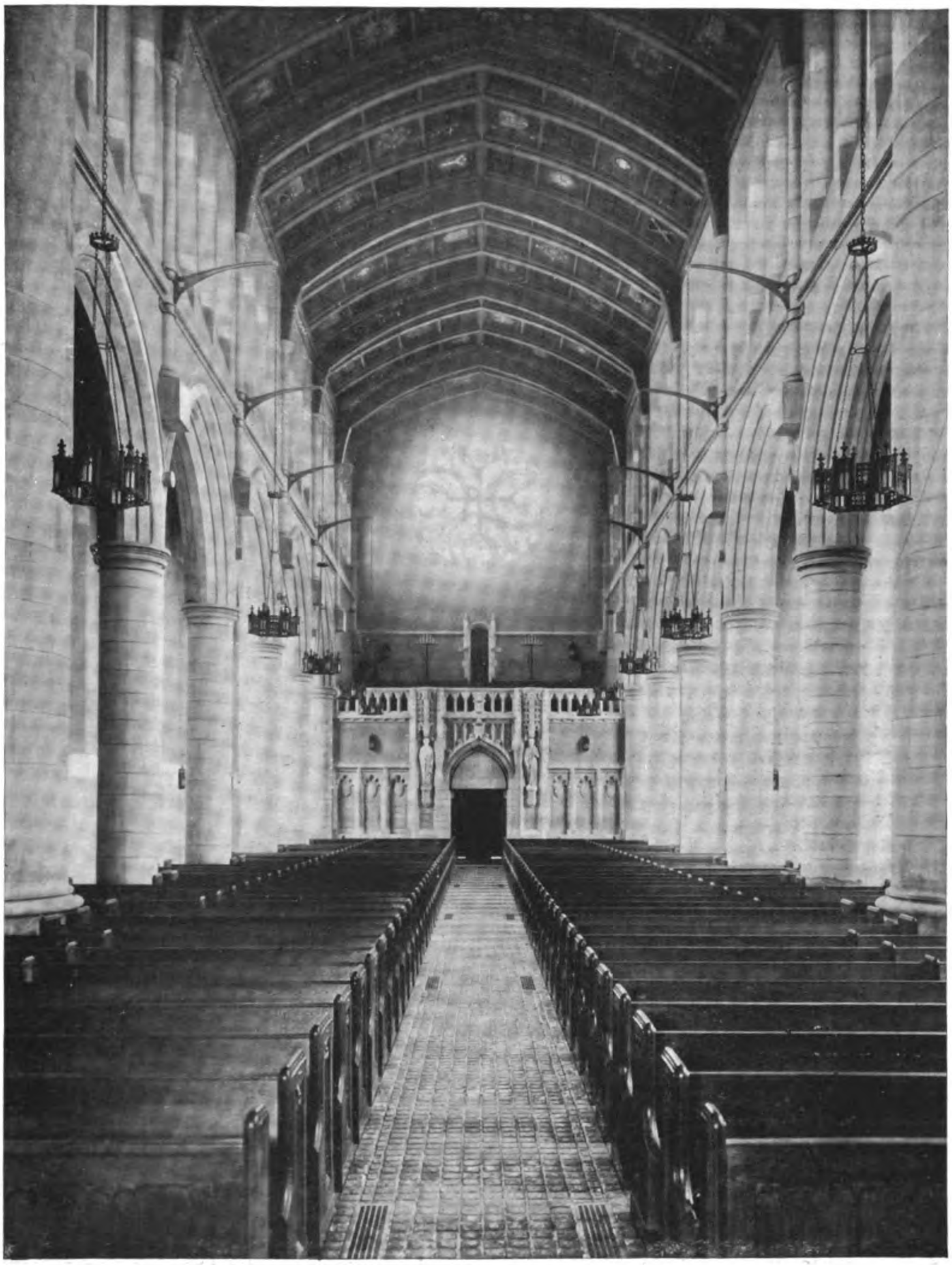


FIG. 8. ST. PAUL'S CATHEDRAL, DETROIT
Cram, Goodhue & Ferguson, Architects.

nected spaces. The problem certainly takes on a simpler aspect when so attacked. An extreme and purely hypothetical case would be a deep and wide auditorium with a very low ceiling, and with a stage recess deep, high and reverberant, in fact such a case as might occur when for special purposes two very different rooms are thrown together. In such a case the reverberation calculated on the basis of a single room of the combined volume and the combined absorbing power, would yield an erroneous value. The speaker's voice, especially if he stood back some distance from the opening between the two rooms, would be lost in the production of reverberation in its own space. The total resulting sound, in a confused mass, would be propagated out over the auditorium. Of course this is an extreme case and of unusual occurrence, but by its very exaggeration serves to illustrate the point. In a less degree it is not of infrequent occurrence. It was for this reason, or rather through the experience of this effect, although only as a nice refinement, that the Boston Symphony Orchestra has its special scenery stage in Carnegie Hall, and for this that Mr. Damrosch in addition moved his orchestra some little distance forward into the main auditorium for his concerts in The New Theatre.

A cathedral is a good example of such geometrical complication, still further complicated by the variety of service which it is to render. It must be adapted to speaking from the pulpit and to reading from the lectern. It must be adapted to organ and vocal music, and occasionally to other forms of service, though generally of so minor importance as to be beyond the range of appropriate consideration. Most cathedrals and modern large churches have a reverberation which is excessive not only for the spoken but also for a large portion of the musical service. The difficulty is not peculiar to any one type of architecture. To take European examples, it occurs in the Classic St. Paul in London, the Romanesque Durham, the Basilican Romanesque Pisa, the Italian Gothic Florence, and the English Gothic York.

The most interesting example of this type has been Messrs. Cram, Goodhue & Ferguson's charming cathedral in Detroit, especially interesting because in the process of correcting the acoustics it was possible to carry to completion the decoration of the original design. The nave, moderately narrow in the clerestory, was broad below through its extension by side aisles. It might fairly be regarded as two simply connected spaces. The lower space, when there was a full audience, was abundantly absorbent; the clerestory, though with wood ceiling, was not absorbent. Although their combined reverberation was great, it was not so great as alone to produce the actual effect obtained. Absorbing material in the form of a felt, highly efficient acoustically, was placed in the panels on the ceiling. The original architectural design by Mr. Cram (figure 7) showed the ceiling decorated in colors, and this though not a part of the original construction was carried out on the covering of the felt, with a result highly satisfactory both acoustically and architecturally. The transept, also high and reverberant, was similarly treated, as was also the central tower which was even higher than the rest of the church. As a matter of fact the results at first attained were satisfactory only with an audience filling at least three-quarters of the seats, the condition for which it was planned. The treatment was subsequently extended to the lower levels in order that the cathedral might be serviceable not merely for the normal but for the occasionally small audience. The chancel did not need and did not receive any special treatment. It was highly suitable to the musical service, and being at the back of both the pulpit and the lectern did not greatly affect that portion of the service which called for distinctness of enunciation.

It may be remarked in passing that the lectern is almost invariably a more difficult problem than the pulpit. This is in part because reading, with the head thrown slightly forward, is more difficult than speaking; because, if the lectern is sufficiently high to permit of an erect position it screens the voice; because a speaker without book or manuscript, seeing his audience, realizes his distance and his difficulties; and finally, because the pulpit is generally higher and against a column whereas the lectern stands out free and unsupported.

The auditorium which has received the greatest amount of discussion recently is The New Theatre in New York. Had it been a commercial proposition its acoustical quality would have received but passing notice. As an institution of large purpose on the part of the Founders it received a correspondingly large attention. As an institution of generous purpose, without hope or desire for financial return, it was appropriated by the public, and received the persistent criticism which seems the usual reward for such undertakings. The writer was consulted only after the completion of the building, but its acoustical difficulties can be discussed adequately only in the light of its initial programme.

It was part of the original programme submitted to Messrs. Carrère & Hastings that the building should be used, or at least should be adapted to use for opera as well as for drama. In this respect it was to bear to the Metropolitan the position which the Opera Comique in Paris bears to The Opera. This idea, with its corollary features, influenced the early design and shows in the completed structure.

It was also a part of the initial plan that there should be two rows of boxes, something very unusual in theatre construction. This was a prodigal use of space and magnified the building in all its dimensions. Later, but not until after the building was nearly completed, the upper row of boxes was abandoned, and the gallery thus created was devoted to foyer chairs. As the main walls were by this time erected, the gallery was limited in depth to the boxes and their antechambers. It thus resulted that this level, which is ordinarily occupied by a gallery of great value, is of small capacity. Notwithstanding this The New Theatre seats twenty-three hundred, while the usual theatre seats but little more than two-thirds that number.

The necessity of providing twenty-three commodious boxes, all in the first tier, of which none should be so near the stage as to be distinctly inferior, determined a large circle for their front and for the front of all the galleries. Thus not merely are the seats, which are ordinarily the best seats, far from the stage, but the great horizontal scale thus necessitated leads architecturally to a correspondingly great vertical scale. The row of boxes and the foyer balcony above not merely determined the scale of the auditorium, but also presented at the back of their shallow depth a concave wall which focussed the reflected sound in the centre of the auditorium.

Finally it should be borne in mind that while the acoustical demands in a theatre are greater than in almost any other type of auditorium, because of the great modulation of the voice in dramatic action, The New Theatre was undertaking an even more than usually difficult task, that of presenting on the one hand the older dramas with their less familiar and more difficult phrasing, and on the other the more subtle and delicate of modern plays. The conventional type of theatre construction is fairly, though only fairly, well adapted to the usual type of dramatic performance. The New Theatre, with a very difficult type of performance to present, was forced by the conditions which surrounded the project to depart from the conventional type far more radically than was perhaps at that time realized.

Here, as usual in a completed building, structural changes and large changes of form were impossible, and the acoustical difficulties of the auditorium could be remedied only by indirection. The method by which a very considerable improvement was attained is shown by a comparison of the line drawing (figure 10) with the photograph of the interior of the theatre as originally completed. The boxes were changed from the first to the second level, being interchanged with the foyer chairs, while the excessive height of the main body of the auditorium was reduced by means of a canopy surrounding the central chandelier. This ingenious and not displeasing substitute for the recommended lowering of the ceiling was proposed by Mr. Hastings, although of course only as a means to an end. The canopy is oval in plan, following the outline of the oval panel in the ceiling, its longer axis being transverse. Its major and minor horizontal dimensions are 70 feet, and 40 feet. Its effective lowering of the height of the ceiling is 20

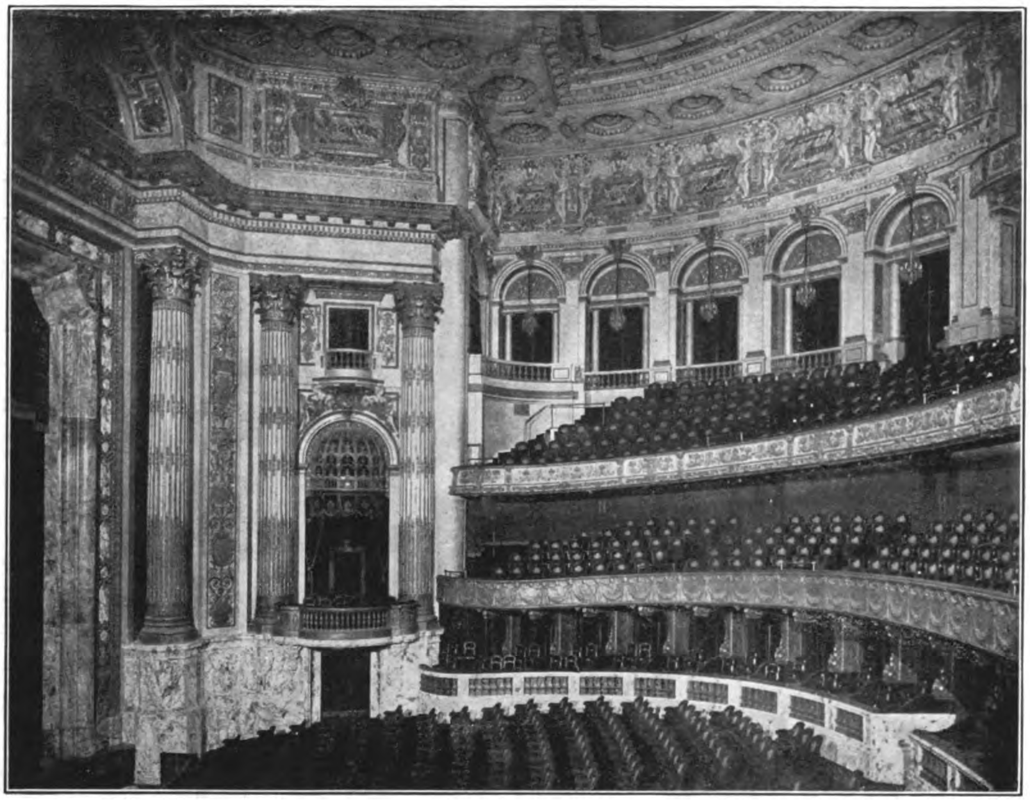


FIG. 9. THE NEW THEATRE
Carrère & Hastings, Architects.

feet. A moment's consideration will show that its effective area in preventing the ceiling echo is greater than its actual dimensions, particularly in the direction of its minor axis. The improvement brought about by this was pronounced and satisfactory to the Founders. The distances, however, were still too great, even visually, for the type of dramatic performance for which the theatre was primarily intended, and such use was therefore discontinued. The New Theatre is much better adapted to opera than to dramatic performances, and it will be a matter of great regret if, with its charming solution of many difficult architectural problems, it is not restored to such dignified purpose.

The last and very satisfactory example is that of the Chapel of the Union Theological Seminary of Messrs. Allen & Collens. Its interesting feature is that the corrective treatment was applied in the process of construction. It is further interesting as an example of a treatment which is not merely inconspicuous, but is entirely indistinguishable. The photograph without explanation is the best evidence of this.

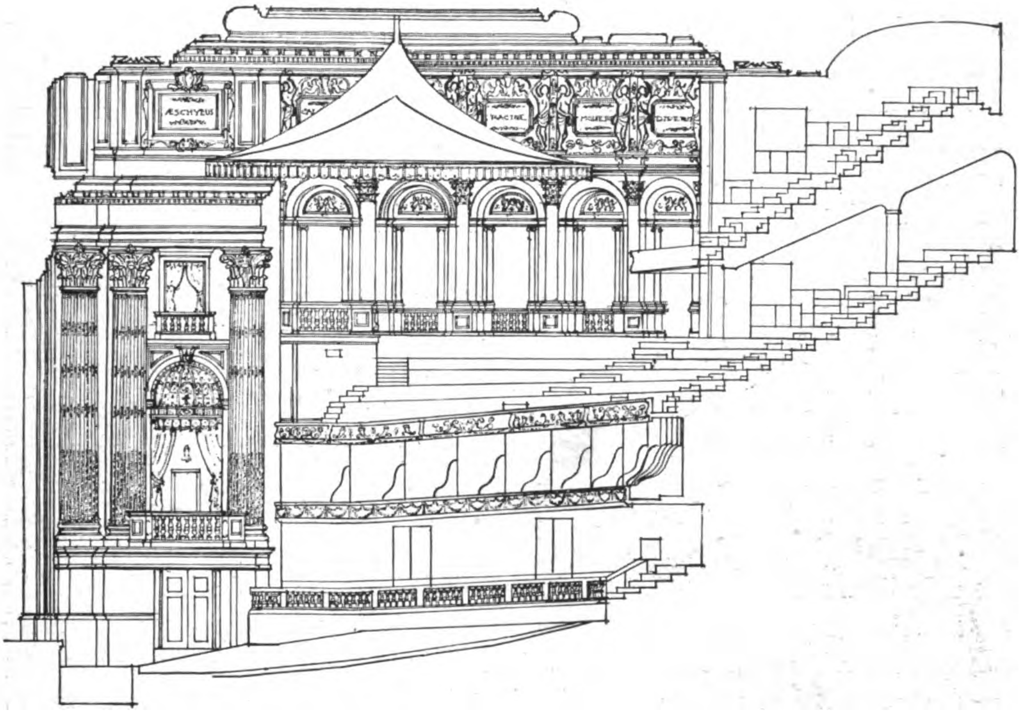


FIG. 10. THE NEW THEATRE, SHOWING CANOPY AND CHANGED BOXES

The above examples have been chosen from many score as typical of the principles involved. In each case the nature of the difficulty has been stated and the method employed in its correction, or at least its special feature very briefly described. The remainder of the paper will be devoted to a discussion of the principles involved in acoustical correction and in presenting the results of some recent experiments.

In discussing the above examples, especially the first and the third, the Congregational Church in Naugatuck, and the Lecture Room of the Metropolitan Museum of Art, consideration had to be given to the effect of the geometrical shape of the room. This aspect of the problem of architectural acoustics constitutes a subject so large that a separate paper must be devoted to its adequate treatment. It involves not merely simple reflection but interference and diffraction, as well as the far from simple subject of the propagation of sound parallel

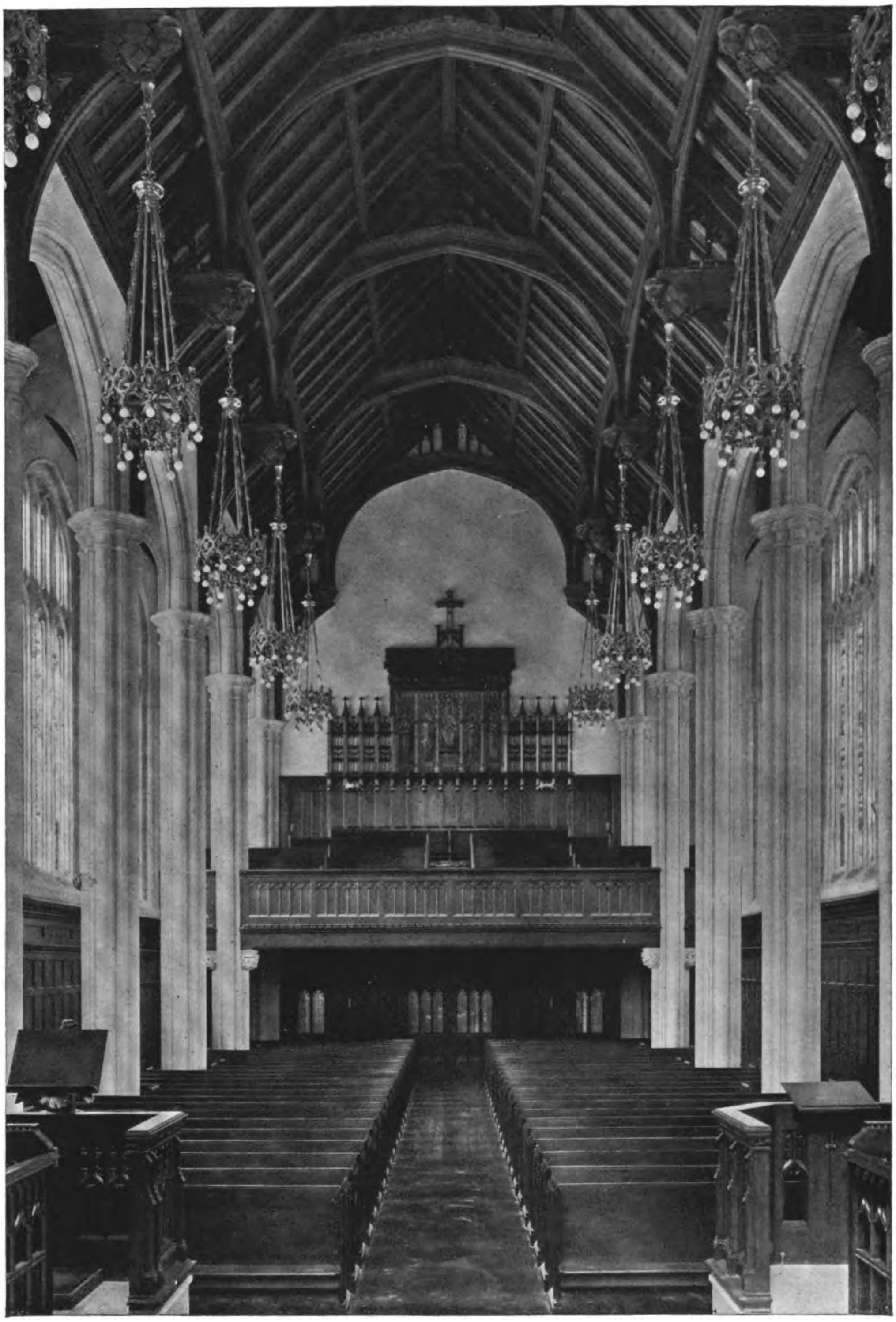


FIG. II. CHAPEL, UNION THEOLOGICAL SEMINARY
Allen & Collens, Architects.

to or nearly parallel to the plane of an audience. It has been the object of special investigation during the past six years. This investigation has recently come to a successful issue and will probably be published in full during the ensuing year. It is suitable that it should receive separate publication for, as it concerns shape, it is of more value for calculation in advance of construction than in the correction of completed buildings. It must here suffice to merely indicate the nature of the results.

When sound is produced in a confined auditorium it spreads spherically from the source until it reaches the audience, the walls, or the ceiling. It is there in part absorbed and in part reflected. The part which is reflected retraverses the room until it meets another surface. It is again in part absorbed and in part reflected. This process continues until, after a greater or less number of reflections, the sound becomes of negligible intensity. Thus at any one time and at any one point in the room there are many sounds crossing each other. In a very simple auditorium, such as a simple rectangular room with plain walls and ceiling, this process is not difficult to follow, either step by step, or by large, but entirely adequate, generalizations. When the conditions are more complicated it is more difficult to analyze; it is also more liable to be a vitally significant factor in the problem. That it has heretofore been inadequately discussed has arisen from the failure to take into consideration the phenomenon of diffraction in the propagation of a sound nearly parallel to an absorbing audience, the phenomenon of diffraction in reflection from an irregular surface, and, above all, the phenomenon of interference. The first of these three considerations is of primary importance in calculating the intensity of the sound which has come directly from the source, in calculating the effect of distance in the audience, and in calculating the relative loudness on the floor and in the gallery, and at the front and at the back of the gallery. The second consideration enters into the calculation of the path of the sound after reflection from any broken or irregular surfaces. The third is a factor of the utmost importance when the sounds which are crossing at any point in the auditorium are of comparable intensity and have travelled paths of so nearly equal length that they have originated from the same element. This latter calls for a more elaborate explanation.

In both articulate speech and in music the source of sound is rapidly and in general, abruptly changing in pitch, quality, and loudness. In music one pitch is held during the length of a note. In articulate speech the unit or element of constancy is the syllable. Indeed in speech it is even less than the length of a syllable, for the open vowel sound which forms the body of a syllable usually has a consonantal opening and closing. During the constancy of an element, either of music or of speech, a train of sound waves spreads spherically from the source, just as a train of circular waves spreads outward from a rocking boat on the surface of still water. Different portions of this train of spherical waves strike different surfaces of the auditorium and are reflected. After such reflection they begin to cross each other's paths. If their paths are so different in length that one train of waves has entirely passed before the other arrives at a particular point, the only phenomenon at that point is prolongation of the sound. If the space between the two trains of waves be sufficiently great the effect will be that of an echo. If there be a number of such trains of waves thus widely spaced, the effect will be that of multiple echoes. On the other hand if the two trains of waves have travelled so nearly equal paths that they overlap, they will, dependent on the difference in length of the paths which they had travelled, either reinforce or mutually destroy each other. Just as two equal trains of water waves crossing each other may entirely neutralize each other if the crest of one and the trough of the other arrive together, so two sounds, coming from the same source in crossing each other may produce silence. This phenomenon is called interference and is a common phenomenon in all types of wave motion. Of course this phenomenon has its complement. If the two trains of water waves so cross that the crest of one coincides with the crest of the other and trough with trough, the effects will be added together. If the two sound waves be similarly retarded, the one on the other, their effects will also be added. If the two trains of waves be equal in intensity, the combined intensity will be quadruple that of either of the trains separately, as above explained, or zero, depending on their relative retardation. The effect of this phenomenon is to produce regions in an auditorium of loudness and regions of comparative or even complete silence. It is a partial explanation of the so-called deaf regions in an auditorium.

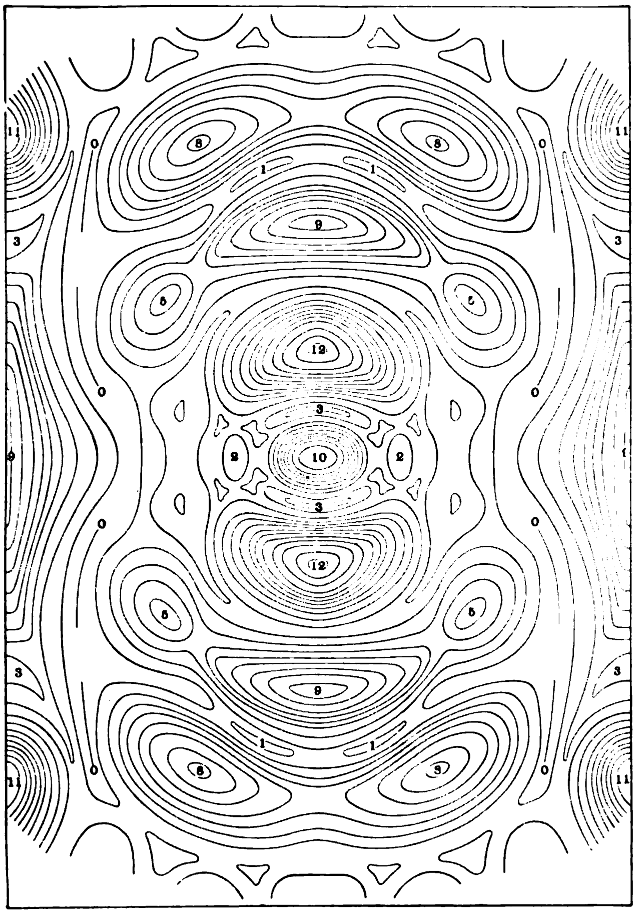


FIG. 12. DISTRIBUTION OF INTENSITY ON THE HEAD LEVEL IN A ROOM WITH A BARREL SHAPED CEILING, WITH CENTRE OF CURVATURE ON THE FLOOR LEVEL

It is not difficult to observe this phenomenon directly. It is difficult, however, to measure and record the phenomenon in such a manner as to permit of an accurate chart of the result. Without going into the details of the method employed the result of these measurements for a room very similar to the Congregational Church in Naugatuck, is shown in the accompanying chart. The room experimented in was a simple rectangular room with plain side walls and ends and with a barrel or cylindrical ceiling. The ceiling of the room was smooth like the ceiling of the Naugatuck Church before it was coffered. The result is clearly represented in Figure 12, in which the intensity of the sound has been indicated by contour lines in the manner employed in the drawing of the geodetic survey maps. The phenomenon indicated in these diagrams was not ephemeral, but was constant so long as the source of sound continued, and repeated itself with almost perfect accuracy day after day. Nor was the phenomenon one which could be observed merely instrumentally. To an observer moving about in the room it was quite as striking a phenomenon as the diagrams suggest. At the points in the room indicated as high maxima of intensity in the diagram the sound was so loud as to be disagreeable, at other points so low as to be scarcely audible. It should be added that this distribution of intensity is with the source of sound at the centre of the room. Had the source of sound been at one end and on the axis of the cylindrical ceiling, the distribution of intensity would still have been bilaterally symmetrical, but not symmetrical about the transverse axis.

As before stated a full discussion of this phase of the subject is reserved for another paper which is now about ready for publication.

In the second, in the fourth, and in part in the third of the above examples the acoustical difficulty was that of excessive reverberation.

If a sound of constant pitch is maintained in an auditorium, though only for a very brief time, the sound spreading directly from the source, together with the sound which has been reflected, arrives at a steady state. The intensity of the sound at any one point in the room is then the resultant of all the superposed sounds crossing at that point. As just shown, the mutual interference of these superposed sounds gives a distribution of intensity which shows pronounced maxima and minima. However, the probable intensity at any point, as well as the aggregate intensity over the room is the sum of the components. Whatever the distribution of maxima and minima the state is a steady one so long as the source continues to sound. The steady condition in the room is such that the rate of absorption of the sound is equal to the rate of emission by the source.

If after this steady state is established the source is abruptly checked, the different trains of waves will continue their journey, the maxima and minima shifting positions. Ultimately the sound will cease to be audible having diminished in intensity until it has passed below what aurists call the "threshold of audibility." The duration of audibility after the source has ceased is thus dependent upon the initial intensity, upon the absorbing material, and upon the location of that absorbing material with reference to the several trains of waves. In special cases the position of the absorbing material is a matter of the utmost importance, but in many cases the aggregate result may be computed on the basis of the total absorbing power in the room.

The prolongation of the sound in an auditorium after the source has ceased I have ventured to call reverberation, and to measure it numerically by the duration of audibility after the abrupt cessation of a source which has produced an average intensity of sound in the room equal to one million times minimum audible intensity. This is an ordinary condition in actual occurrence.

In the 1900 papers published in the *Engineering Record* and the *American Architect*, this subject of reverberation was discussed at great length, and it was there shown how it might be measured and indeed how it might be calculated in advance of construction. In addition to the formula many coefficients of absorption were determined, such data being absolutely necessary to the reduction of the subject to an exact science. This work related to sounds having a pitch an octave above middle C.

But it was of course obvious that the acoustical quality of an auditorium is not determined by its character with reference to a single note. The next series of papers, published in 1906, therefore extended the investigation over the whole range of the musical scale giving data for many materials and wall surfaces, and rendering a more complete calculation possible. At the conclusion of these papers it was shown how the reverberation of an auditorium should be represented by a curve in which the reverberation is plotted against the pitch and by way of illustration a particular case was shown, that of the large lecture room in the Jefferson Physical Laboratory, both with and without an audience. This curve is reproduced in the accompanying diagram (Figure 13).

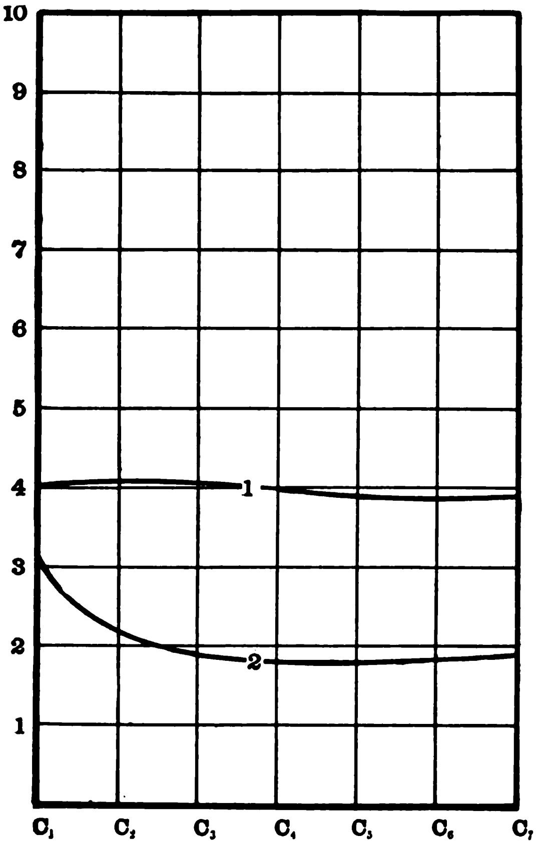


FIG. 13. CURVES SHOWING THE REVERBERATION IN THE LECTURE ROOM OF THE JEFFERSON PHYSICAL LABORATORY WITHOUT AN AUDIENCE AND WITH AN AUDIENCE FILLING ALL THE SEATS

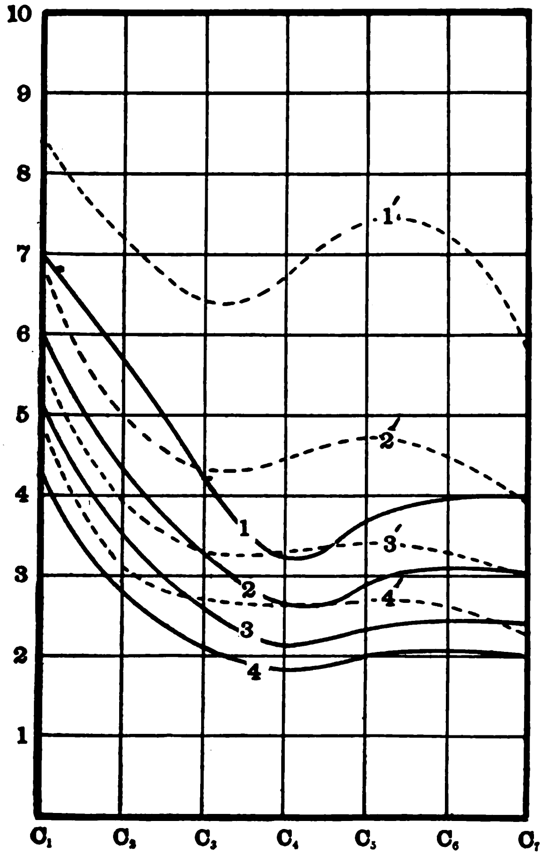


FIG. 14. CURVES SHOWING THE REVERBERATION IN ST. PAUL'S CATHEDRAL, DETROIT BEFORE (1′, 2′, 3′, 4′) AND AFTER (1, 2, 3, 4) CORRECTIONS, EMPTY AND WITH A ONE-QUARTER, ONE-HALF, THREE-QUARTER AND FULL AUDIENCE

In the process of investigating an auditorium such a curve should be drawn as definitive of its initial condition and then in the determination of the treatment to be employed similar curves should be drawn representing the various alterations proposed and taking into consideration the location of the surfaces, their areas and the nature of the proposed treatment. The accompanying diagram (Figure 14) shows the result of this computation for the more interesting of the above examples, St. Paul's Cathedral, Detroit. In this diagram curves are drawn plotting the reverberation of the cathedral in its original condition, empty, and with a three-quarters audience, and with a full audience, and again after its acoustical correction also empty, with a three-quarters audience, and with a full audience.

Reprints of the papers just mentioned were mailed at the time to all members of the American Institute of Architects. Duplicates will gladly be sent to any one who may be interested in the further perusal of the subject.

Brief mention has been made of the dependence, in special cases, of the efficiency of an absorbing material on its positions in an auditorium. For example, in the room whose distribution of intensity was shown in Figure 12 the absorbing material would have much greater efficiency in reducing the reverberation if placed so as to include maxima, than if so placed as to include minima. That this would be true is obvious. The magnitude of the effect, however, is not so clear for the maxima and minima shifts as the sound dies away. It was therefore submitted to an accurate experimental investigation. The results are shown in the adjacent diagram, Figure 15. In this diagram the curve marked 1 shows by its vertical ordinates the normal efficiency of a very highly absorbent felt. If so placed in the room as to include on its surface the maxima of intensity of the sound it had an effective absorbing power as shown in Curve 2, a truly remarkable increase over its normal value. Curve 3 shows the efficiency of the same felt when placed against the side wall. It there included more maxima than minima for the lower notes, but more minima than maxima for the higher notes, with a resulting efficiency curve which is very irregular.

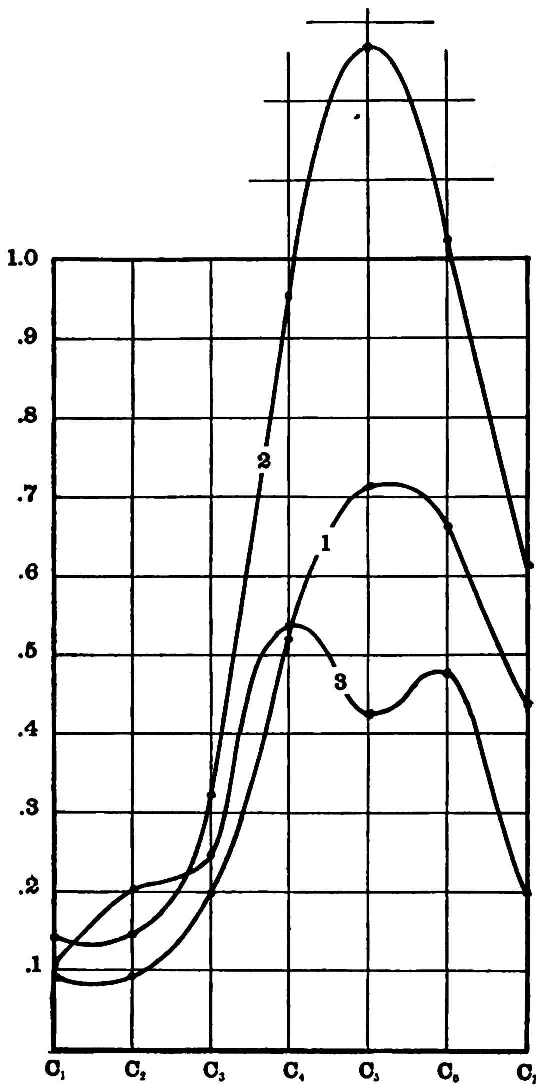


FIG. 15. SHOWING THE RELATIVE EFFICIENCY OF FELT IN DIFFERENT PARTS OF A ROOM HAVING A BARREL CEILING

CURVE 1, NORMAL ABSORBING POWER; CURVE 2, ABSORBING POWER IN THE CENTRE OF THE ROOM; CURVE 3, ABSORBING POWER AT THE SIDE OF THE ROOM. C_3 IS MIDDLE C, 256.

The following experiments were performed for the H. W. Johns-Manville Company in the search for an efficient absorbing material and an effective method of treatment. The absorbing efficiency of felt is dependent on the flexibility of the mass as a whole and on its porosity. It is not in large measure dependent on the material employed, except in so far as the nature of that material determines the nature, and therefore the closeness, of the felting process. The same materials, therefore, might very well have either a very high or a very low absorbing efficiency, depending entirely upon the process of manufacture. The nature of the material is here specified, not with the idea that it alone can determine the quality, but merely as an additional piece of information. In addition to this, in each case the ratio of the solid material to the free space is given; but even this does not define in full the essential conditions. The absorbing power is determined not merely by the ratio of the air space to the solid material, but by the size of the pores and by the elasticity and viscosity of the mass as a whole. In Figure 16 Curve 1 is a hair felt, the one alluded to above as of exceptional efficiency. The fraction of its total volume, which is solid material is 0.12. Curve 2 is a mixture of hair felt and asbestos, whose solid portion is 0.19 of its total volume. Curve 3 is a felt wholly of asbestos $3/8''$ thickness, whose solid portion is 0.33 of its total volume. In this latter the asbestos fibre is felted to an asbestos cloth which serves to strengthen it greatly. Curve 4 is for an asbestos felt without reinforcement. That a considerable fraction of its absorbing power is due to its elastic yielding as a whole is shown by its rather sharp maxima.

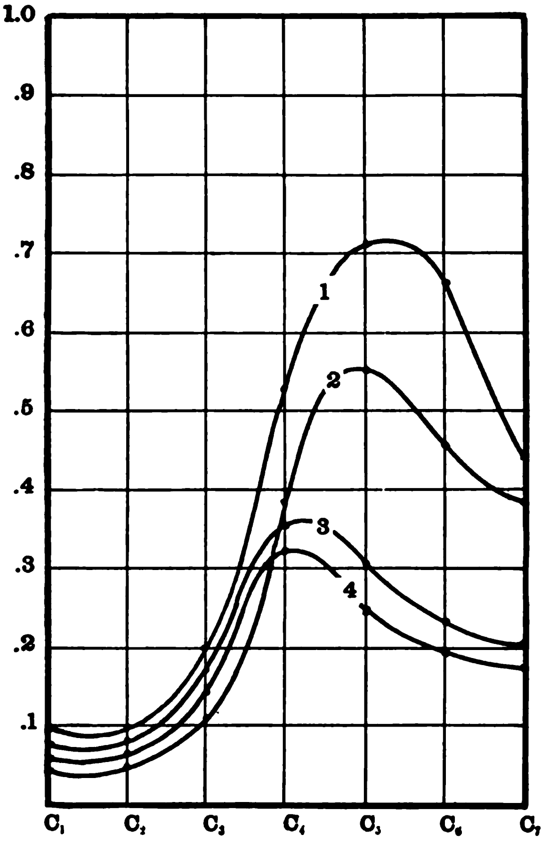


FIG. 16. ABSORBING POWER OF VARIOUS KINDS OF FELT AS DEFINED IN THE TEXT

C3 IS MIDDLE C, 256.

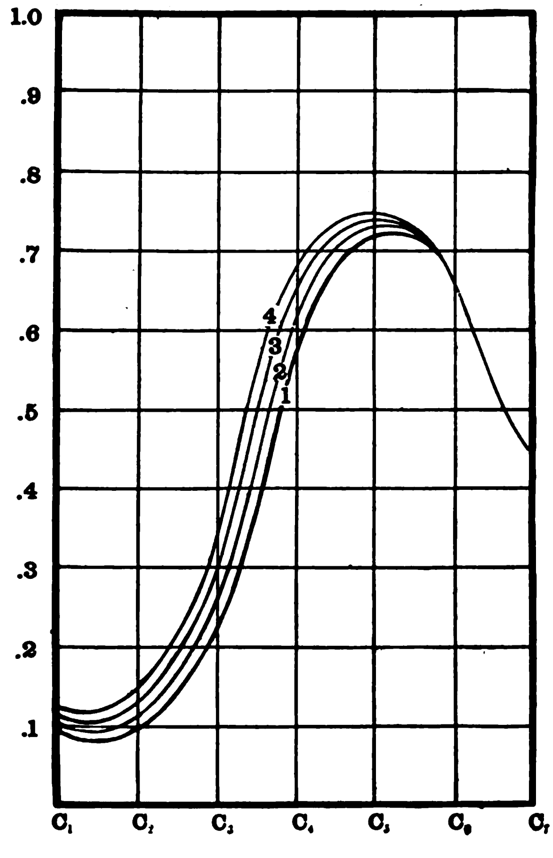


FIG. 17. EFFECT OF AIR SPACE BEHIND FELT

CURVE 1, FELT IN CONTACT WITH THE WALL; CURVES 2, 3, AND 4, FELT AT DISTANCES OF 2, 4, AND 6 INCHES FROM THE WALL.

The curves in Figure 17 show the effect of holding the felt at different distances from the wall. In each case it was held on a wire grating. Curve 1 is when the felt is as near the wall as the grating would permit, perhaps within a quarter of an inch of the wall. Curve 2 is when the felt was held at a distance of two inches; Curve 3 at four inches; and Curve 4 at six inches from the wall. It is evident that there is a slight gain from an air space behind the felt, but it is also evident that this gain is so slight as to be entirely incommensurate with the cost of construction and its loss in durability.

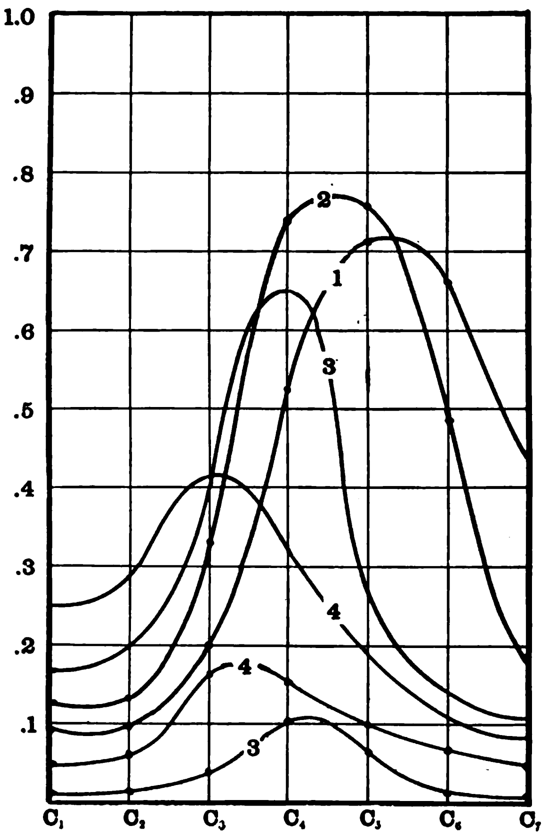


FIG. 18. CURVES SHOWING THE EFFECT ON ABSORBING POWER OF MEMBRANE COVERING CURVE 1, FELT; CURVE 2, BURLAP CEMENTED WITH SILICATE OF SODA; CURVE 3, LIGHT MEMBRANE AS DESCRIBED; CURVE 4, HEAVY MEMBRANE AS DESCRIBED; LOWER CURVE 3, LIGHT MEMBRANE ALONE; LOWER CURVE 4, HEAVY MEMBRANE ALONE

The Curves in Figure 18 show the efficiency of various coverings. Curve 1 is the normal exposed efficiency of the felt above referred to. Curve 2 is its efficiency when covered by burlap attached by silicate of soda. This covering was so sized as to be practically impervious, but was in contact with and a part of the felt. Curves 3 and 4 show the efficiency of coverings which are not in contact with the felt, but which are stretched. Both coverings are impervious—3 relatively light, 4 heavy. Number 3 weighs 0.87 ounces to the square foot; number 4 weighs 2.58 ounces to the square foot. The materials of which these coverings are made has no bearing on the question, and would be misleading if stated. The really significant factors are their weight, the tension with which they are stretched, their elasticity, and their viscosity. The weight of the several coverings has been stated; the other factors can be defined best by means of their independent absorbing powers. Lower curves 3 and 4 indicate the absorbing power of the membrane coverings alone. It is interesting to note that the diaphragm which has by itself the least absorbing power has the greatest absorbing power when combined with the felt. This is by no means a paradox. It is exactly the result which could be predicted by application of the simplest of physical principles.

SOME MEDIEVAL TOWN HALLS OF ITALY

FELLOWSHIP THESIS BY H. E. WARREN, S.M. IN ARCH. '05

APPLETON TRAVELLING FELLOW IN ARCHITECTURE 1905-1907

NEXT to the cathedral, the most important and interesting building of the typical medieval Italian city was the town hall or communal palace. Around it as a centre, as soon as the independent city governments asserted themselves, was grouped the whole civic life of the people. It was generally located near the cathedral, on the most important square of the town. It was a congregating place in time of strife and festival. Its arcades or courtyard were often used as a market place. The council hall often saw the beginnings of the most savage factional feuds, as well as the gatherings of indignant citizens against an external foe, be it a sister city, a foreign invader, the Emperor, or even the Holy Father himself.

Many of these buildings, similar in style and of nearly the same epoch, have come down to us in various degrees of preservation, and indeed some of them still serve the purposes for which they were erected several centuries ago, purposes which are so admirably expressed in their architecture. Their history as it has been handed down to us is absorbingly interesting, and, could they reveal to us all that has passed within their walls, we should doubtless find the story still more crowded with incidents thrilling and often blood-curdling.

One wonders that, in a territory so torn by faction, by devastating wars and plagues, there was any chance for progress of any kind. Yet the physical condition of the Italian cities of this period was far in advance of that of other cities of Europe. Emperors and popes, nobles and lords, at first held down the common people. But, as wealth increased, ancient dreams of freedom revived within the towns, and the burghers, strong within the walls which kings and emperors had permitted as protection against foreign foes, rose against their feudal oppressors, establishing forms of local government as diverse as the varying local traditions and circumstances which gave rise to them. The instant they found themselves strong, with an endurance born of past hardships, there was no limit to their activity and power. Commerce and wealth began to increase and with it an intense spirit of local patriotism and rivalry. It was the beginning of an age of enlightenment and awakening due to the stimulating influence of self-government and forming one of the strongest tributes thereto.

Previous to this awakening of the people there were probably no houses of government. At least none have come down to us, for only the churches and monastic establishments were spared by the wasting hand of the successive conquerors. The government was largely in the hands of the despot lords of the fortified castles. Although some of the cities were large in point of population, there was little commerce, and society was in a state of general tumult. As the towns grew in strength, the feudal lords established by the Empire sometimes encouraged their development; but in most cases, the tyranny of the lords jealous of the new power, increased, and, largely under the leadership of the bishops, the towns, able now to resist oppression, drove out the counts, and when from their castles in the surrounding country they continued to tyrannize or oppose the towns, the people in many cases attacked and destroyed the castles of the feudal nobility. The municipal forms of government now established differ in every town. In some towns the "people" is distinct from the "commune" and we have a *palazzo del popolo* side by side with a *palazzo del commune.* The chief magistrate and the councils have various titles and different powers. In some places a noble from some allied city is chosen as "Podestà" to administer justice and endeavor to control local factions. In all cases the new freedom so fiercely won and so jealously guarded led to increasing civic self-conciousness and civic patriotism.

From this intense local pride of the citizens, monuments—both ecclesiastical and civic—were bound to result. Of the latter the communal towers were probably the first. They were used alike for bell towers and watch towers, built sometimes over the city gates and often in the public squares. When the town hall was built later, a tower of this sort became one of its chief features.

Under various names, these buildings are to be found in nearly every town of considerable size, singularly the same in general style, but varying according to the importance of the commune, the tastes and condition of the people, and the materials and wealth at hand. Those of Tuscany are usually of stone, and are much more severe in character than those of the north, which are oftener of brick and more open in treatment, indicating a less disturbed state of society.

As Florence was the leader of civilization in Italy, and of the world, she was also one of the first of the greater cities to erect a permanent and monumental house of government. Although it was the palace of the Podestà, and not a town hall as we think of the meaning of the word, yet it was erected by order of the people for their governing magistrate.

To obtain any clear idea of the methods of government which followed each other in rapid succession in nearly all of the Italian cities, so torn by internal and external strife, is rather difficult because of the lack of clear accounts. A slight review of these systems however, as far as relates to the buildings we are studying, is necessary to a proper understanding of their uses and reason for being. Florence may be taken as typical in this regard.

Up to 1100, Florence was of little importance; but from then until 1200 its success in warfare, commerce, and manufactures was rapid enough to render it the chief city in central Italy. The government had been carried on by the nobles through from four to six Consuls, assisted by one hundred Buonuomini. From 1207 the judicial functions were entrusted to the Podestà, a nobleman of legal erudition elected for a period of six months (afterward for a year). The nobles, however, were constantly embroiled in bitter feuds and became divided into two parties, the Guelfs and the Ghibellines. As the stronger party usually controlled the Podestà, the parties proved detrimental to the interests of the city, and the people formed a sort of national guard and cried for a "Capitano del Popolo" who was assisted by a council and ruled in conjunction with the Podestà. About 1250 a palace was commenced for the use of the latter. Some authorities state that this structure, now known as the Bargello, was erected for the "Capitano." Probably this is not correct, however, for we hear of the "Palazzo del Capitano del Popolo" as one of two palaces which already existed at the rear of the Palazzo Vecchio when the latter was commenced. The Capitano del Popolo did live later in the Bargello, and it takes its name from him as he was commonly called "Il Bargello." He finally assumed practically all of the duties of the former Podestà.

As the greatness and prosperity of the city had been built up on the foundation of trade and manufactures, so the pride of the citizens, at the height of its power, rested on the same foundation. The guilds of wool weavers maintained agents in Paris, London, Bruges and Venice; and Florentine bankers held sway in all the countries of Europe, especially in France. It is only natural that these guilds, together with others, should become vitally connected with the government of the city. Towards the end of the thirteenth century, the heads of the guilds, called Priors, became the consuls and in 1182, under the name of Signoria, arrogated to themselves the supreme power of the city. Sixteen years later they ordered the architect of the commune to build for their use the Palazzo dei Priori, or della Signoria, now known as the Palazzo Vecchio. Even after the family of the Medici had succeeded in the attainment of despotic power the old palace was thus used until 1532, and eight years later it became the residence of Cosimo I, who had assumed the title of Duke of Tuscany, and who had it renovated so that its interior has largely lost its original character. It is now used as a town hall.

The Bargello, now most appropriately used as a national museum, is altogether typical of its class and decidedly representative of the civic life grouped around it. It is stern and fortress-like in the character of its design and construction, and gives little idea that Florence would ever emerge into the light of a peaceful era. The design, nevertheless, is one of extreme dignity, beauty and interest.

As it stands now, the building is roughly 100x200 feet, three stories in height; but the greater part of this was not intended in the original scheme, as the difference in the character of the work amply attests. The building at first consisted only of two stories of the block in front of the court. This is built of cut stone with few and small openings in the lower story while the severity of the second is scarcely lessened by the few openings in the form of round arches enclosing two pointed cusped lights. These windows are the prototype of many of the larger windows of Tuscany for the next hundred years. The third story and the whole of the mass of buildings surrounding the court on the other three sides are of rough ashlar. There is no bonding of the stones between the old part and that surrounding the court.

The most beautiful feature of the whole design is this courtyard, so often pictured as to need little description. It is perhaps the best extant example of civic architecture of medieval Florence. It is worthy of much study because of its excellent scale, its strength and beauty of design and detail, and above all for its simplicity. In the lower story on three sides is a broad, low arcade, three bays on each side, and in the second story on one side is a fine loggia in six bays, two arches corresponding to one below. In the other stories are one- and two-light windows. The arches of the lower story, scarcely semicircular, are supported on octagonal piers having admirable caps and well moulded bases. Those of the loggia are about semicircular, but the piers are not as fine as those below. The vaulting is very simple and strong, and in the loggia is well decorated. A most important feature of the court is the straight staircase which ascends along the blank side of the court to the loggia. Half way up is a landing with a massive stone gateway, upon which hangs its old wrought iron gate of beautiful design and simple construction.

On the second floor of the old portion is a fine vaulted hall in two nearly square bays. Simply by knowing the dimensions of the great hall, 52x85x60 feet high, one is made to realize its impressiveness, but added to these are its decorations of old battle flags which at once stir one's imagination in a most wonderful and impressive way. The rest of the interior is comparatively unimportant.

The simple battlemented tower, about eighteen feet square, which rises from an angle of the building is built of the same rough stone as the later portions of the building and possibly replaces one of an earlier date. The stairs in the earlier building must have been in the tower or in the small apartment next to it, for an exterior staircase would not have been expedient on a building destined to withstand siege. As is the case with almost all buildings of its class, its beauty and interest result from the absolute directness with which the requirements were met in the simplest possible way. There are no superfluous features of composition or detail. Exteriorly, it is a simple mass, crowned by a machicolated cornice with battlements, and pierced by the least number of openings that would admit the necessary light. The corbels, projecting from the walls at intervals for the support of scaffolding for the use of the fighting men, and also for the support of poles for decorations during festivals, cast crisp shadows which give the otherwise plain wall an interesting texture, and with the shadows of the cornice form the chief decoration.

The architecture of the Palazzo Vecchio is similar to that of the Bargello, but even more severe in expression. It is said that the architect took as a model the castle of Conte di Poppi, built in Casentino by his father. The palace was built on the site of two houses bought by the republic for this purpose, and it probably occupied a whole side of the Piazza della Signoria when the houses advanced into it much more than at present. Had the piazza been as large as at present, Arnolfo doubtless would not have been cramped for space, and would have given his plan more regularity, placing his building in the middle of the square, perhaps, or at least free-standing. But such was not the case, for on the rear two buildings joined it, one of which was the Palazzo del Capitano del Popolo already mentioned. The belief that the tower is built on the foundations of the tower of one of the destroyed palaces accounts for its being off axis, and also, to some extent, for its oblong plan and the necessity of daring construction. The building as we see it now evidently resulted from conditions not very apparent today. The problem was one dealing with an irregular site, one so often presented to the architect of today.

As in the Bargello, the lower story is broken only by a small door and tiny windows, while the next two stories are pierced by windows very similar to those in the Bargello, already cited as being typical Tuscan openings in buildings of this class. Above is a great open gallery carried on the arches of a boldly projecting corbel-table. The whole is crowned with square battlements. The exaggeration in size of this gallery, recalled by a similar treatment in the tower, is one element which contributes to the impressiveness of the design.

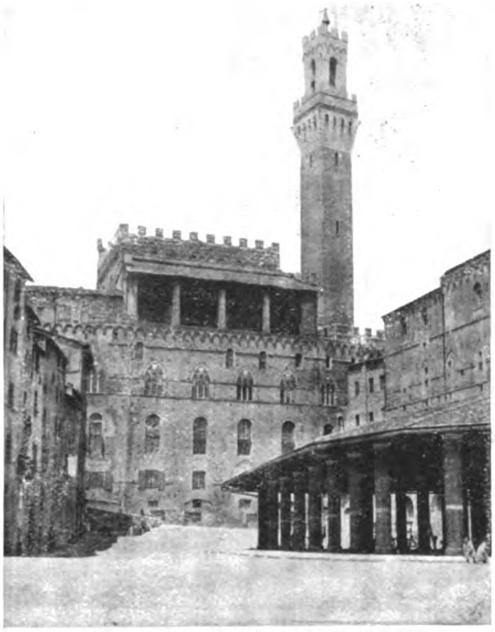
The front of the tower rises directly from the gallery, some four feet in advance of the main wall of the building, to a height of 300 feet above the street. The arches of the corbel-table directly under the tower are smaller than those on either side, and this marks the only recognition given the tower as it joins the building. As beautiful and as daring in construction as this tower is, it is hardly as graceful as some cases where the tower starts visibly from the ground, as at Siena. Battlements, both Guelf (square, in the building itself) and Ghibelline (forked, in the tower), are introduced into the design, as both parties were too strong for either to be ignored.

Before the principal entrance to the palace, on the piazza, was formerly a wide stone platform, called the *ringhiera*, a word derived from "arringare" meaning to harangue. Here sat the Signoria during public festivals, and from here were announced the decrees of government. The same name was given to the small balconies of the town halls, used for a similar purpose.

The courtyard, while not as large or as interesting as that of the Bargello, is not without interest even in its present Renaissance aspect. It was necessary to replace the original piers by stronger ones and thus the court lost most of its medieval character. The latter is also true of the whole interior of the building. Owing to various additions, the building is much larger today than it was originally, when the court occupied about half of the ground floor and the council chamber led from the gallery of the second floor.

Close to the Palazzo Vecchio is the Loggia dei Lanzi, commenced about seventy-five years after the palace to provide a sheltered meeting place for the Priori during elections and other public functions. From it were read the decrees of government, just as they had previously been from the *ringhiera*. The loggia and the piazza together formed an excellent sort of open air town hall. In fact, it was intended to build the loggia around the piazza, which would have made it the most magnificent and imposing public square in the world. The thought of this piazza surrounded on three sides by this vaulted arcade of almost unexampled splendor and on the fourth side by the palace itself, with the magistrates seated at one side in robes of state and the people assembled in the remainder of the portico and in the open, is most thrilling and awe-inspiring. Since this was never realized, we may console ourselves with the thought that perhaps the arcade, with its huge scale, would have not only impaired the scale of the palazzo itself, but would have interrupted the fine view now to be obtained from the distant corners of the piazza.

One of the most interesting of medieval Italian buildings is the Palazzo Pubblico at Siena. The conditions out of which it grew were somewhat different from those at Florence. There were not the commercial and manufacturing interests, nor the high intellectual and artistic development. Notwithstanding this, the civic pride and patriotism of the citizens was not less ardent. No more striking illustration of their interest and activity in their city affairs could be cited than the building of their cathedral. The bishop and clergy exercised no authority in the matter. The people were the rulers; it was a civic work more than ecclesiastic, and the majority of votes in the popular assembly determined not only how the work should be carried on, but elected the architect and overseers who were engaged in it. This would hardly have been possible in a city so torn by internal strife as was Florence. The fighting of the Sienese was, for the most part, carried on outside their walls against foreign foes. This had considerable influence on the buildings both public and private. In the first place, we hear of only one government building here, instead of three as in Florence. The next thing that strikes one is the comparative openness of the houses as well as the Palazzo Pubblico. In fact, the Florentine buildings are the climax in severity of expression, for nearly all the other town halls, large and small, are less forbidding in aspect. The next point to be noted is that the architect, Agostino of Siena, deviated from the usual blocky mass by following the slightly irregular lot line, and by the elevation of the central portion of the building with its picturesque bell-gables, and by the well placed tower. The character of the architecture is of the Sienese style of the period, a style so extended and so graceful as to create about the city an interest—a uniformity perhaps—not to be found elsewhere in Italy. Other towns have more monuments and finer architecture, but few seem as consistent, and carry one back so far toward the days of their activities.



PALAZZO PUBBLICO
SIENA

The building is of brick, with a little stone judiciously used. One very characteristic feature is the segmental arch under a pointed bearing arch. In the upper stories the segmental arch is replaced by two, or by three, pointed and cusped arches carried on slender columns. It is quite evident from the corbel-tables, still existing over the second story of the wings, that this was the original position of the main cornice, while in the central portion it was perhaps over the third story. The tower was not intended in the original design if we are to believe the bit of corbel-table now built into it over the second story. Possibly also it was intended to have the building symmetrical about the axis of the central portion. Slight changes have been made in the upper stages of the central portion, which was built with five windows in the third, and four in the fourth story. These changes, contrary to alterations in general, doubtless have improved the building in appearance.

The building itself was commenced in 1287 or 1289 and the tower in 1325. The latter, 22 feet square and about 300 feet high is one of the most graceful and beautiful of towers in a land so rich in monuments of this kind. Its design is in thorough accord with that of the building from which it rises, and while wholly medieval in character it has little of the severity of the tower at Florence. It is remarkable for its extreme slenderness and plainness, until it bursts out at the summit into the belfry-stage which really gives it its reason for being. Mr. Howells well describes it when he says: "When once you have seen the 'Mangia,' all other towers, obelisks and columns are tame and vulgar and earth-rooted; that seems to quit the ground, to be not a monument, but a flight."

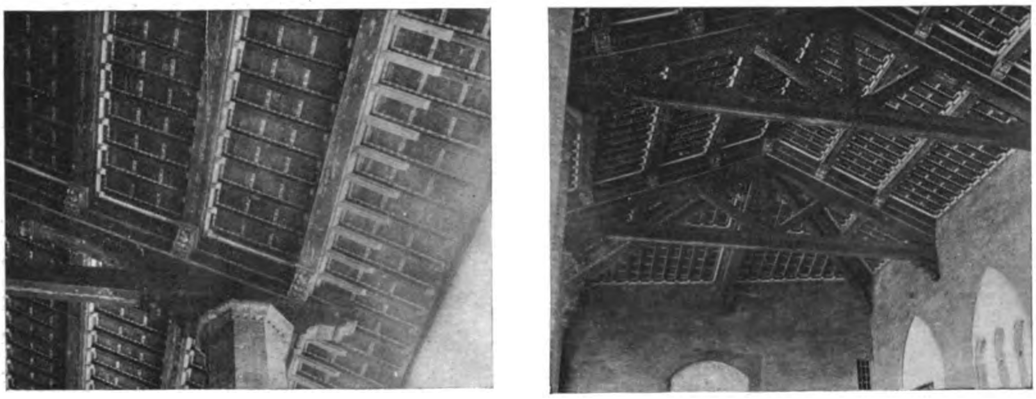
At the foot of the tower is the Cappella di Piazza, in the form of a square loggia built to commemorate the deliverance of Siena from the terrible plague of 1348, which carried away a considerable number of the inhabitants, variously estimated from 30,000 to 80,000. The design is simple and refined.

At the rear of the building, on the north side, are the prisons of still later date, connected with the palazzo itself by a great arch of 35 foot span carrying a terrace. Under this arch one originally descended to the market place behind the palace, which is very picturesque from this point of view.

The interior of the building is interesting on account of its arrangement, as well as for its frescoes and other decorations. The courtyard, which formerly gave the principal access to the building is much smaller in effect than originally, as the arcade on the ground floor has been walled up to form apartments. It is still very interesting in its simple treatment in brick. The court occupies about one third of the area of the building. The rest of the ground floor was formerly occupied by store rooms of various sorts.

In the central portion of the edifice, on the second floor, is the old council chamber, now called the Sala del Mappamondo. It is a fine room about 30x80 feet, interesting on account of its fine frescoes and beautiful beamed ceiling. Opening from it by means of arches is the council chapel, as beautiful in idea as in frescoes and details. Conspicuous among the latter is a fine wrought-iron grill which closes the chapel from its vestibule. Adjoining the council room is a smaller but similar apartment, the Sala della Pace, now used as a court room.

In the upper story, on the rear, reached by a long straight flight of stairs is a fine loggia which has an interesting timber roof. The loggia evidently served as a vestibule to the great council chamber which was installed after the one on the second floor had been deemed too small. Part of it is now being fitted up again as a council room.

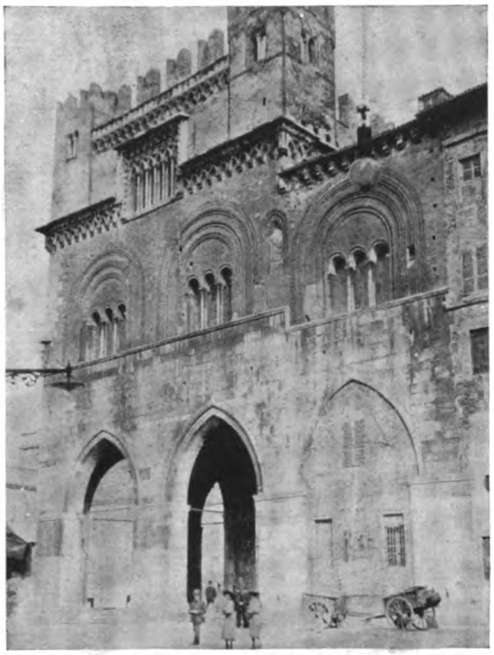


CEILING OF LOGGIA, PALAZZO PUBBLICO, SIENA

The details of the whole building are simple and delicate and contrast well with the broad brick wall surfaces. Many of the bricks of the palace, as in most of the Sienese work, show slight markings evidently made by a cold chisel after the bricks were baked. They are so slight as not to be visible at any great distance, their purpose being merely to break the dull surface caused by the baking, in order to expose some of the live red color of the interior of the brick.

The buildings so far described, together with the Ducal Palace in Venice, which may be said to be in a class by itself and is therefore not considered here, are the largest and most important town halls in Italy. There are, however, many smaller ones of the same period which are worthy of much study. Of these some have been badly mutilated, rebuilt or neglected. But in many a town there exists under one name or another, in good condition, the old house of government, the permanent expression of the growing spirit of municipal patriotism and freedom of those far off times. Many of them serve today the purpose for which they were constructed five or six centuries ago. Some of the names by which these buildings are known, besides those already spoken of are, Palazzo della Ragione, Palazzo del Consiglio, Palazzo Communale, Palazzo dei Consoli, etc., while the smallest are called simply Broletto, or town hall. At Volterra and Montepulciano, they were built on a smaller scale, under the conscious influence of those at Florence and Siena, while many others show direct influence of their more powerful neighbors.

The largest building of this group is the Palazzo Communale at Piacenza, commenced in 1281 and interesting on account of its wonderful brick work. The arcade of five pointed arches, in stone, surmounted by the second story of brick, pierced by six groups of small windows under semicircular bearing arches and crowned by a simple interlacing arched cornice, surmounted by picturesquely arranged battlements, form an ensemble well proportioned, grand in scale and very impressive. Burckhardt says of this building that it is "one of the earliest examples of a worthy and monumental embodiment in stone and mortar of the growing spirit of municipal independence." There is a certain lack of connection between the two stories on account of the difference in material, yet this is atoned for to some extent by the introduction of several courses of red marble alternating with courses of white, near the top of the lower story. This tends to draw the color of the brick above into the stone below.


PALAZZO COMMUNALE, PIACENZA

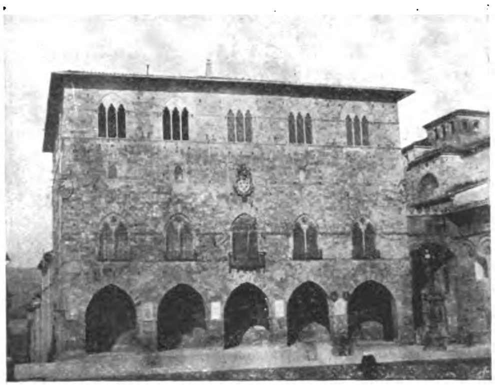
In the original scheme there was to have been a square cortile, surrounded on the ground floor by a double arcade, and above, on the front, by the great hall, and on the other three sides by offices. The cornice line of the wings was dropped about four or five feet below that of the hall portion, thus giving the latter a pleasing predominance when the building was seen in perspective. The end of the hall is treated on one end with a gable and rose window, and on the other by a fine grouped window. It is a great pity that only one bay of each of the side wings was built.

At present the structure is undergoing repairs which revealed the position of the original stairs, an interesting discovery even if the arrangement was cramped and awkward. The interior of the great hall is now stripped of its former furnishings, showing only its rough brick walls and timber roof. It is a room of noble proportions, 54 feet wide by 144 feet long, beautifully lighted on all four sides. It takes only a little imagination to picture the place in all its former splendor.

The most interesting feature of the building at present is the fine brick work, especially of the second story archivolts, remarkable for their variety of design and workmanship, a most logical and appropriate solution of decoration in moulded brick. Here and there are evidences that the bricks were tooled slightly after being laid, but this is not general. The color of the moulded brick is identical with that of the plain wall surface. This is not true, unfortunately, of much of our modern moulded brick work. Very noticeable points are the way in which the decorated surfaces are kept flat, and the slight reveals. Bold projections are not logical in an architecture of brick, nor are they needed for effect in a land of intense sunlight. Each archivolt is over five feet wide and is composed of several bands of moulded or decorated bricks. The large number of grey, radiating joints is in itself very decorative. When one realizes that the archivolts are all different and that there are no examples of like work in the vicinity, one sees how much thought and time were expended in making the numerous moulds which were destined to form but a few bricks each. The very means by which this building is made interesting is denied the architect today on account of the great cost of the moulds.

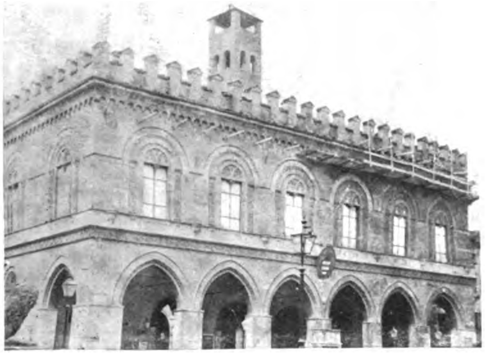
At Perugia there were originally three houses of government, one of which, the palace of the Podestà, has disappeared with the exception of a beautiful arched doorway. If one is to judge by this fragment, the palace must have been quite as fine as either of the two existing buildings. These are the Palazzo del Capitano del Popolo and the Palazzo del Municipio, of which the latter is by far the most interesting. It is a huge stone pile, commenced in 1281. Its three stories are pierced by numerous and closely set windows, mostly of three lights. It is unique also in having two large entrances, one on the Corso and one on the Piazza del Duomo, the former giving access to the building in general, while the latter at the head of a fine flight of steps gives access directly into the great hall. This, the most interesting part of the building, is a grand room fit to be the centre of Perugia's chequered civic life. It is divided into three bays by great transverse arches carrying a flat ceiling. Each bay is lighted by one of the fine windows, 6 feet 10 inches wide. The arches have a span of 46 feet. The feature of the room is its decoration with painted armorial bearings. City and state, prelate and noble, all are represented, until the whole room, walls and arches, is a veritable book of Perugia's departed great ones.

The Municipio at Pistoja, of 1294, is rather fine on account of its good proportions, extreme simplicity, and beautiful warm grey stone in broad masses. On the ground floor was, originally, an arcade two bays deep on the front and one on the sides. This has now been reduced to one bay deep on the front only. The second story is very high, and is lighted by groups of two pointed arches under pointed bearing arches. The low third story has three-light, pointed and cusped openings under pointed bearing arches. The whole is crowned by a simple projecting wooden roof. The wall is unbroken except for slight string courses. The detail is confined to the windows, even the arches of the ground floor having no archivolts. The whole is, therefore, not rich, but very satisfactory.



PALAZZO DEL COMMUNE, PISTOJA

The interior of the building is quite uninteresting. The cortile is suppressed almost to the form of a light-well, and the great hall on the second floor has been reduced to half its former size. The third floor is now being remodeled to accommodate the municipal museum.

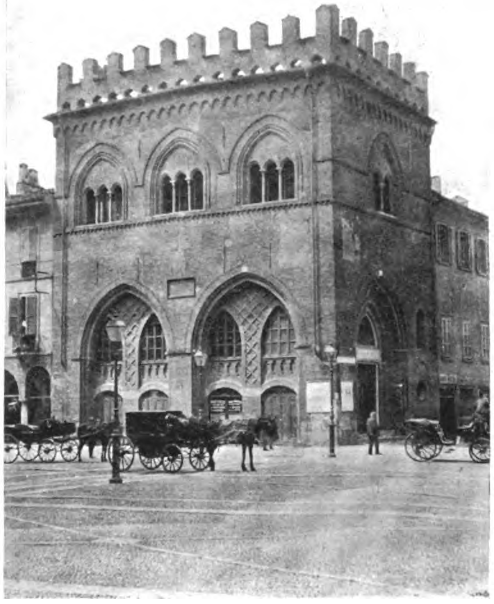


PALAZZO PUBBLICO, CREMONA

The Palazzo Pubblico at Cremona, of 1245, has been greatly modernized especially in the second story where new windows have been installed. Slight traces on the walls show the outlines of the original windows. There is another building in Cremona, now used as a store house for builders' supplies, which is very similar to what the Palazzo Pubblico was. The ground story arcades are the same and the outlines of the second story windows are the same. The store house retains its windows, which are much like some at Monza and Milan to be spoken of later. While somewhat similar to the building at Piacenza, it is vastly less impressive and interesting.

Next to the Palazzo Pubblico is a small building called the Palazzo dei Giureconsulti dating from 1292. On the ground floor is a high arcade of two bays on the front and one on the back, in addition to which is a small door, which corresponded to the stairs which led to the second story. This has three windows of three lights each, under high pointed arches. The archivolts of these windows partake somewhat of the character of those at Piacenza but are not as rich or as varied.

At Bologna the town hall has been so encased in work of a later time that it



PALAZZO DEI GIURECONSULTI, CREMONA

is almost unrecognizable as a medieval building as is also the former Palazzo del Podestà, which is now used as the town hall, although the former building still carries the name of Palazzo Communale. At Verona there is very little remaining of the house of government except the tower and the interesting exterior staircase supported on arches very irregularly spaced. The tower was built in 1172 by the Lamberti family as a part of their palace, and came into the hands of the city nearly two centuries later. At this time it was altered and beautified so that it is now one of the most charming in Italy. Up to nearly half its height it is constructed of alternate bands of stone and three courses of bricks. This is not merely a veneer, for the same construction appears on the inside of the tower.

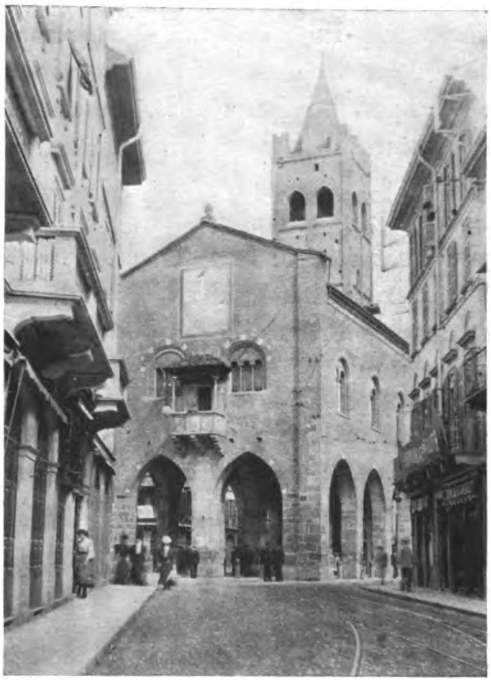
The staircase, though not of the best detail, is nevertheless interesting. Originally it was intended to cover the stairs by a wood roof supported on columns, similar to the arrangement which now exists on the Broletto at Bergamo. The bases of the columns still exist on the posts of the balustrade.

Among the most important "broletti" are those at Como, Brescia, Bergamo and Monza. The Brescia example is interesting chiefly as showing the various changes and alterations through which medieval buildings often passed. The original broletto now forms a portion of an irregular mass of buildings of several distinct epochs and may be seen on the accompanying sketch plan. The old broletto itself is very heavy and severe in character and not interesting architecturally.

The other three buildings are of two stories with an open arcade on the ground floor, generally used as a market place, and the town hall is in the second story, reached originally by exterior staircases. The Bergamo town hall presents nearly all of the general features of the one at Como, including its curious irregularities.

The Como example is one of the oldest, dating from 1215. The entire building, including the octagonal piers of the lower arcade, is built of alternate courses of dark and light colored marbles, which have so mellowed with age as to present very beautiful and varied masses of color. The great irregularity of plan is one feature which soon strikes the visitor. The rear façade is longer than the front by the width of the old tower, while the number of bays in each façade is the same. Thus the rear arches have a larger span and consequently the piers of the two façades do not line up. Furthermore the curve of the rear arches is similar to that of the front arches, and, as they rise to the same height, the springing line of the rear arches is lower than that of the front by about 2 feet 10 inches. The second story bays do not line up with those below, while the "ringhiera" is not in the centre of the front, but is between two windows. The third window is more important than the other two and thus the composition is balanced. When the cathedral was built, a few feet were taken from one end of the broletto. At this time the original staircase disappeared, for traces on the building show that it issued from the second story, on the rear, next to the present cathedral wall. It probably descended along the end of the building, landing in the little piazza in front of the building. The details of the building are simple and vigorous.

The Broletto of Monza is one of the smallest of the group, and is very attractive because of its extreme simplicity. It is almost entirely of brick except the piers, which are stone. The second story is lighted by simple two- and three-light windows having semicircular bearing arches. The building is two bays wide by five long. A simple tower with forked battlements rises over one bay at the end of the building. Despite the fact that, in direct elevation, the tower appears to cut the building in two, in reality this is not objectionable on account of its location with regard to the surrounding streets. The piers of the arcade have neither caps nor bases, and the high pointed arches have no mouldings, only a band of darker bricks, varied now and then by blocks of stone, enclosing the voussoirs of brick. The brick joints of the arcade and of the windows are much smaller than those of the general wall surface. The three middle bays of the sides are slightly larger than those at the ends, a refinement which contributes much to the charm of the building. The position of the *ringhiera*, on the end of the building instead of on one of the long sides, is quite unusual.



THE BROLETTO, MONZA

As early as 1228 the citizens of Milan built a group of public buildings including palaces for the Podestà and consuls, a prison, arsenal, etc. About all that remains of the group is the Palazzo della Ragione. It is very similar to those at Cremona and Fano, and is almost identical with the Broletto at Monza, except that it is larger, having seven bays on the side instead of five. The ground floor is now occupied with shops, although restorations are in progress.

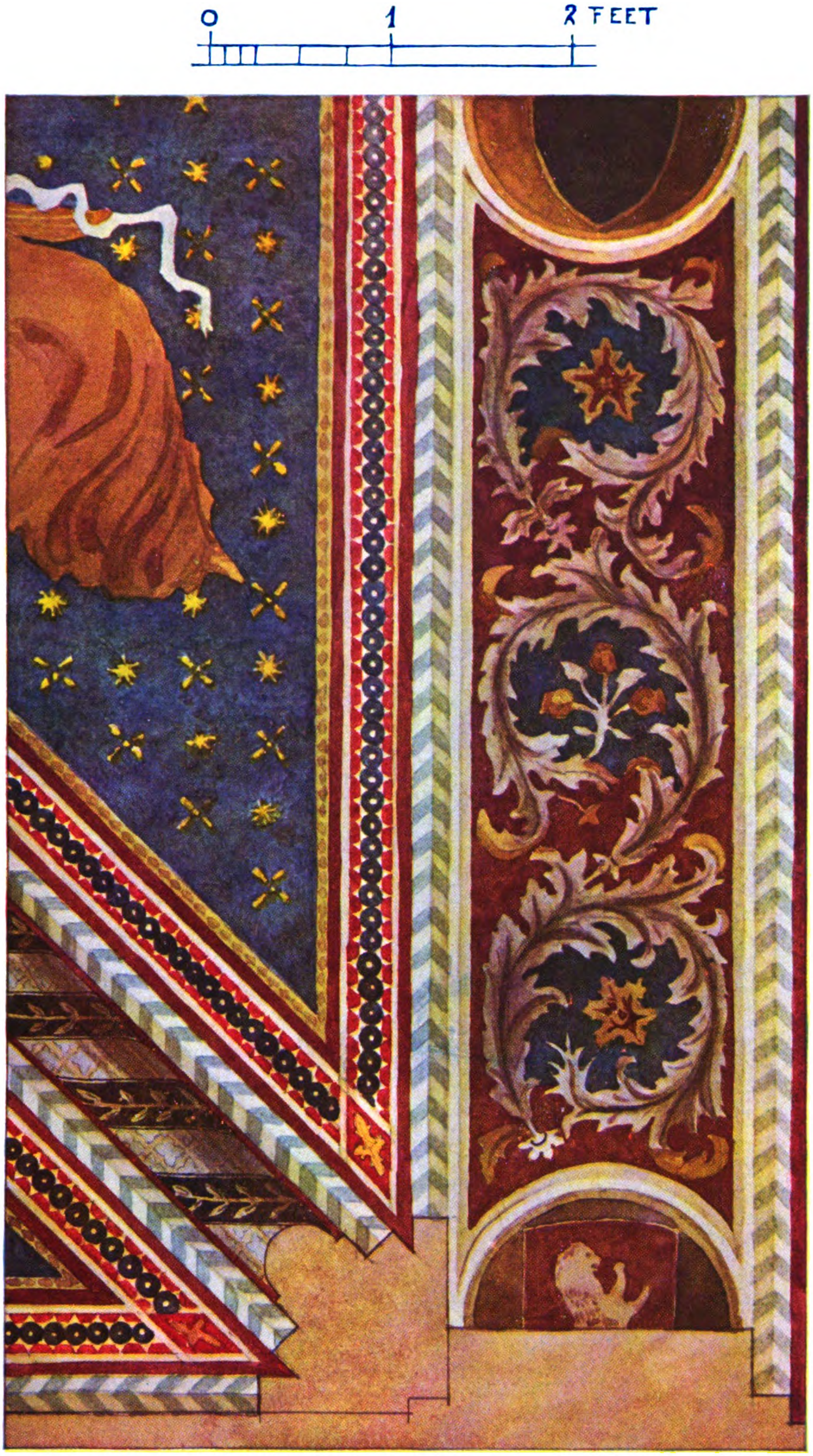
Across the Piazza dei Mercanti, the center of the medieval city, is a building of municipal character called the Loggia degli Osii, erected in 1316. It is quite exceptional among the civic buildings of the time. It is a three story edifice, of stone, of which the first two had originally open arcades, while the third has a range of niches in groups of three corresponding to the arches below. There are three bays in all. Between the first and second stories is a parapet divided into rectangular panels containing armorial bearings. In the centre is the *ringhiera*, which is sufficient to indicate the original purpose of the building. It has recently been very well restored, although it is still used for business purposes.

Many other interesting town halls might be cited; but the study of them would show little of value which could not be found in the largest and best examples already mentioned.

We have seen how the Gothic period was characterized by a growth towards a more hopeful view of life, and towards personal and institutional liberty. At the opening of the era the arts and graces of life were hardly practised, save in the cloisters of the monasteries, for without all was bloodshed and war. There was little evidence of the light into which the struggling people were slowly emerging. The people were ever growing stronger and the warrior lords soon had to reckon with the vast populations of the cities. Architecture for the first time was now employed freely in the interests of the people, and not exclusively for the church. The efforts of these rude people, still struggling for their existence amid the turmoils of war, to express in worthy form the higher capacities of their nature, is the cause of that indefinable yet resistless charm to be found in all things pertaining to medieval life. In the buildings, the result was a great variety, picturesqueness and vigor, often lacking in the more finished and refined styles.

The early and vigorous growth of municipal and popular freedom led, as we have seen, to two classes of government buildings, the palace of the Podestà and the great council hall appearing under various names. These buildings were, however, similar in character and, despite a certain openness in some, they were somewhat fortresslike in feeling, not inappropriately, since they were together the seat of authority in turbulent times.

The Italians were able to develop the application of Gothic forms in their public halls with more freedom than in the churches, because they were unfettered by traditional methods of design. They, however, never thoroughly mastered the principles of the Gothic style. This lack of understanding is even more manifest in the government buildings than in the churches, and even in these the amelioration of the lowness of proportion and the heaviness of construction of the Romanesque period is all that can be noticed in the direction of Gothic principles even up to the time when the classic traditions resumed sway. Some of the smaller broletti, however, are light and open on account of the graceful treatment of the ground story arcade. As charming as these old houses of government are in many ways, one speaks of them as Gothic, simply because they were built in the so-called Gothic period, and present numerous details and forms derived from those to be found in the true Gothic style of the north. The Italian examples seem incomplete and inorganic when compared with the work of the north. In fact, after the time of the Romans, the Italians never became more than decorative designers, and they seem never to have shown much of the scientific knowledge and inventive, constructive genius displayed by the builders of northern Europe. On the other hand, owing to the comparative lack of civic development, northern Europe can nowhere show such a wonderful series of medieval civic buildings as still forms one of the glories of Italy.

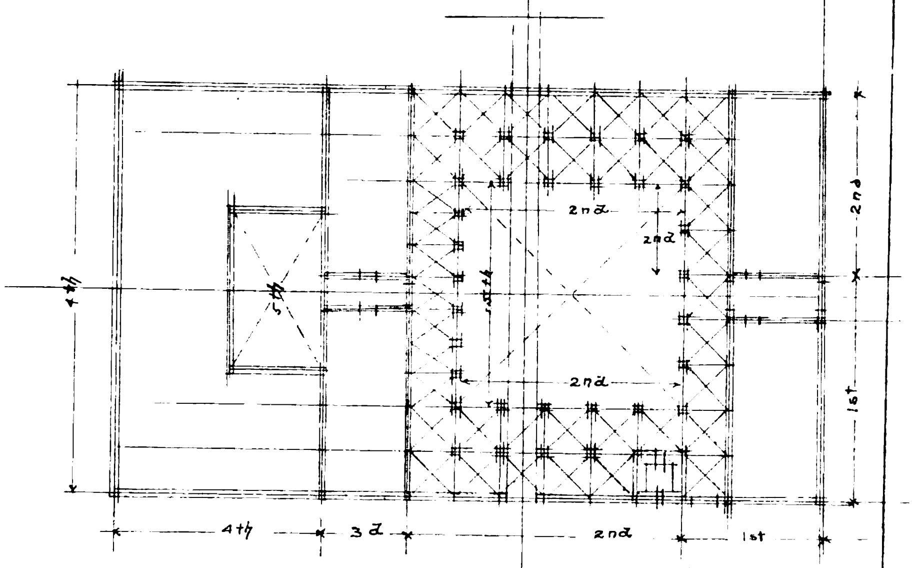


VAULT DECORATIONS OF THE COUNCIL CHAPEL,
PALAZZO PUBBLICO, SIENA.

H. E. WARREN, S. M., IN ARCH. '05. APPLETON TRAVELLING FELLOW, 1905-1907.

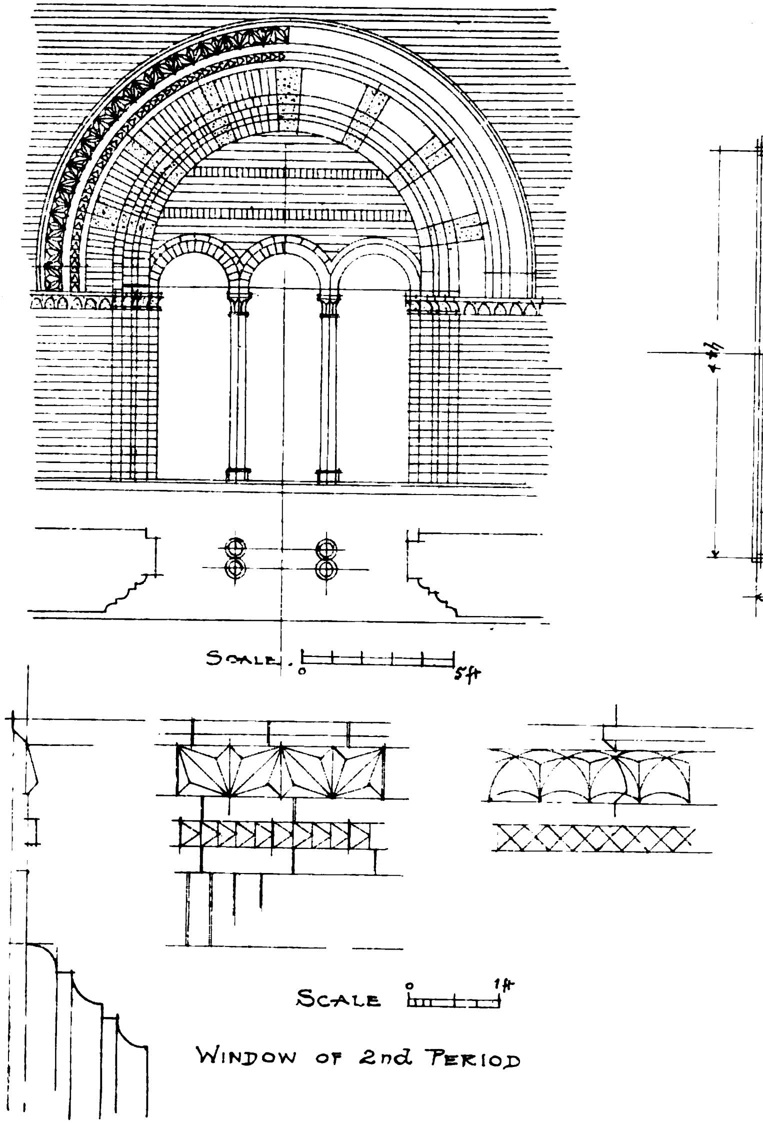
SUPPLEMENT TO THE MARCH ISSUE OF THE ARCHITECTURAL QUARTERLY
OF HARVARD UNIVERSITY

THE TOWN HALL
BRESCIA



SKETCH PLAN, (NO SCALE)

1st - Original Building, of stone. Tower still older
2nd - First addition, in brick.
3d = Church of S. Agostino—front now incorporated into Building,—of brick.
4th = Next addition, of brick
5th = Renaissance portion, of stucco.
Cornice of 3 and 4 is the same.



WINDOW OF 2nd PERIOD

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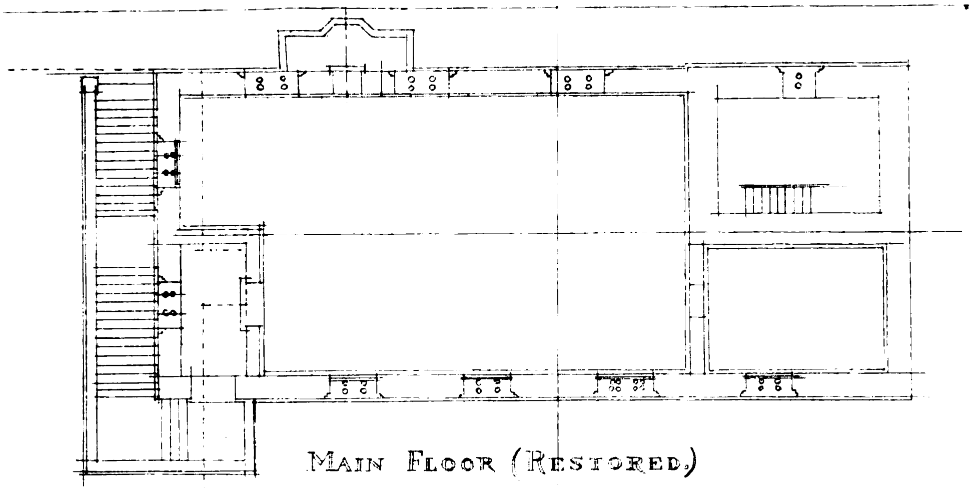
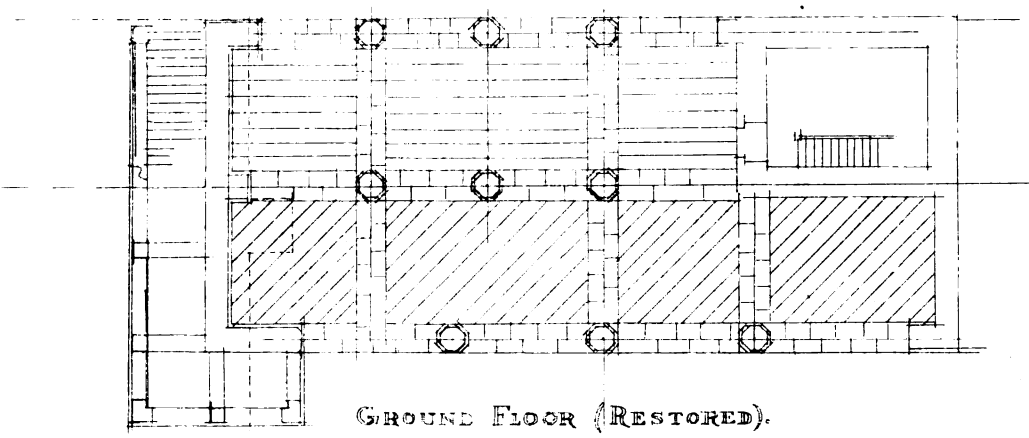
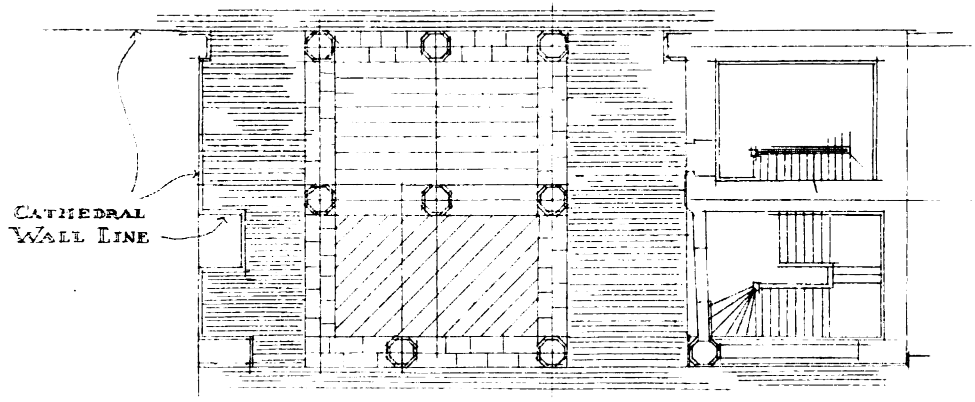
COLLEGE
OF
ARCHITECTURE.



MAIN FLOOR (RESTORED.)



GROUND FLOOR (RESTORED).

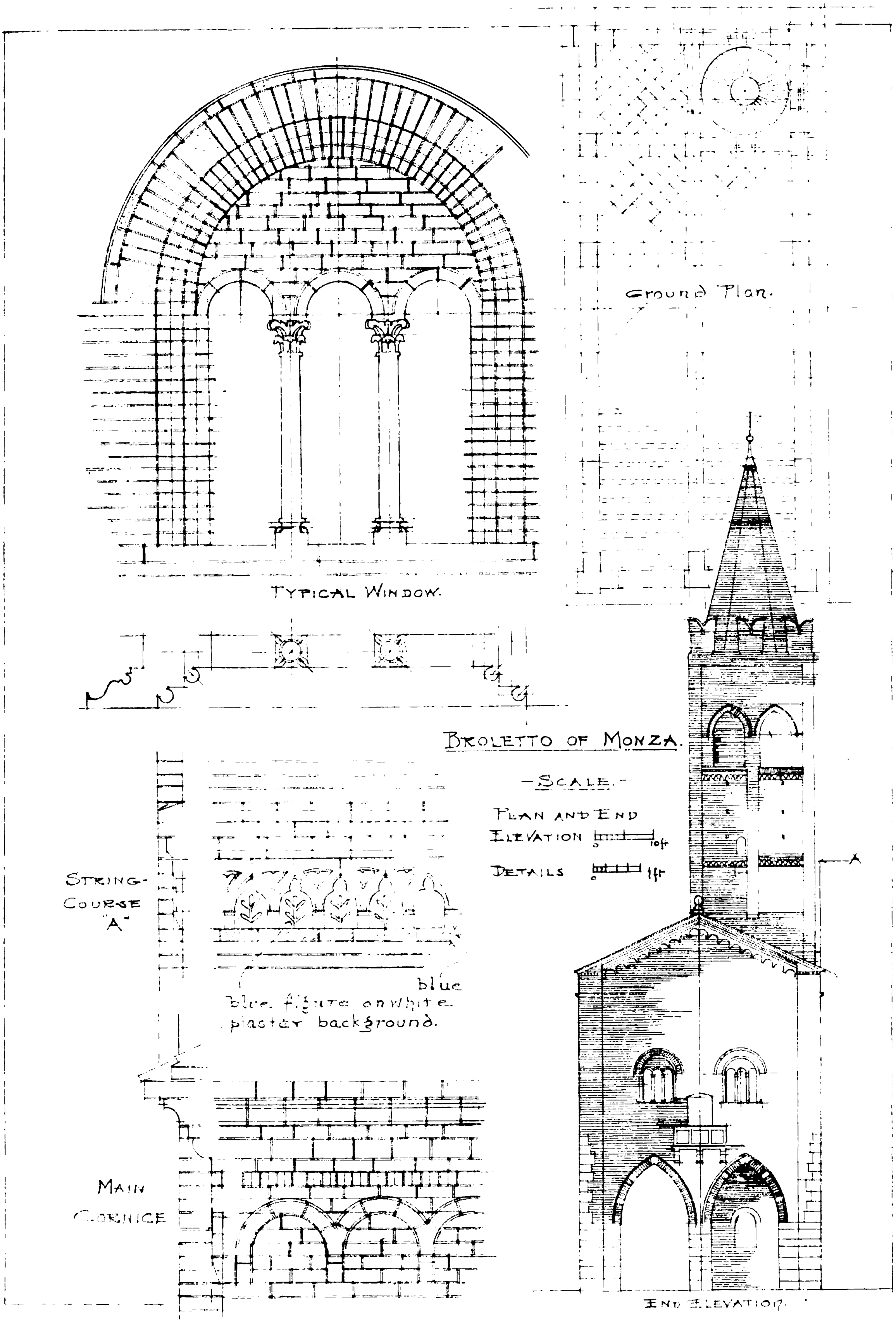


GROUND FLOOR (ACTUAL).

PLANS OF THE TOWN HALL,
COMO.

SCALE

CORNELL UNIVERSITY.
COLLEGE
ARCHITECTURE.



BROLETTO OF MONZA.

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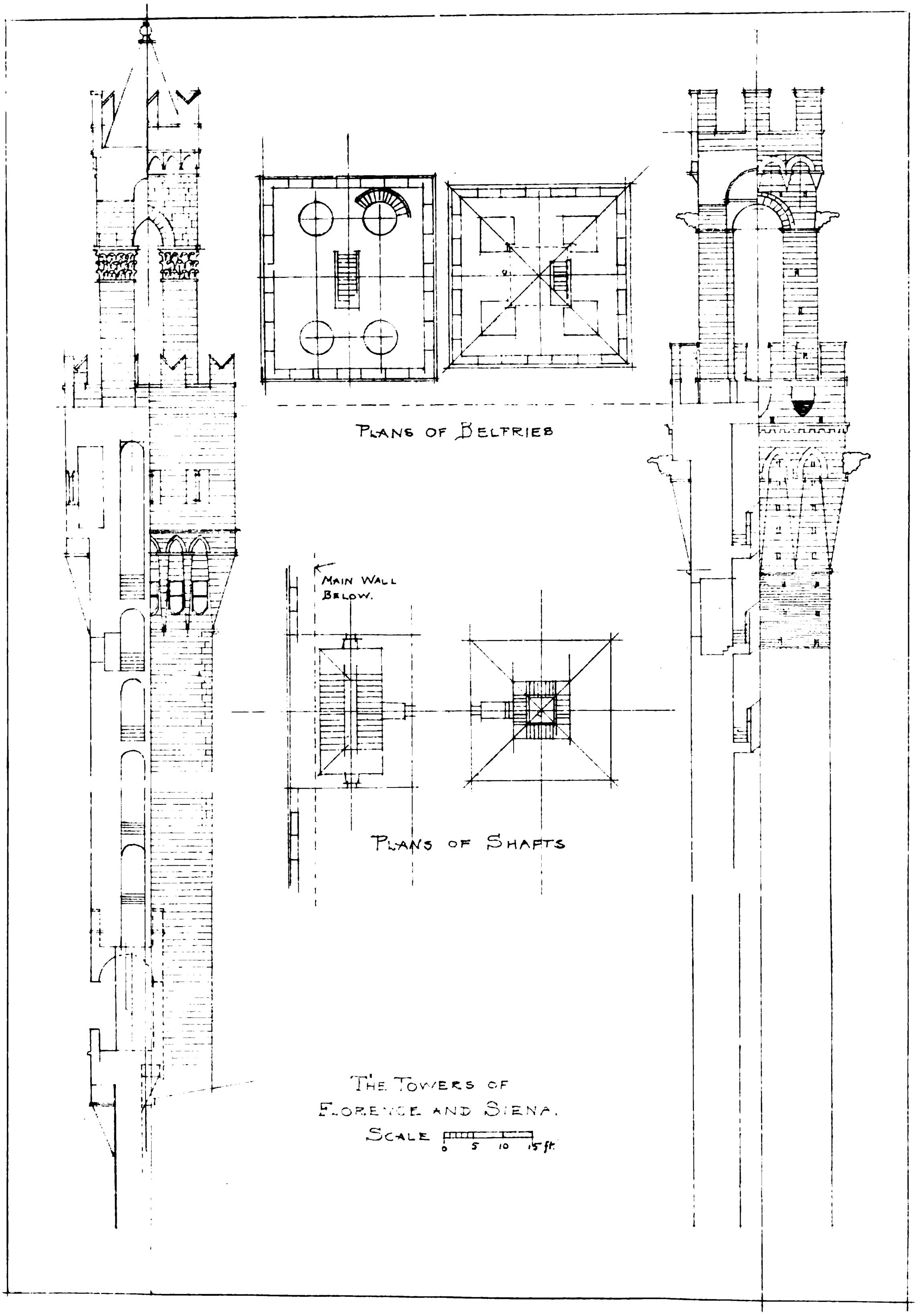
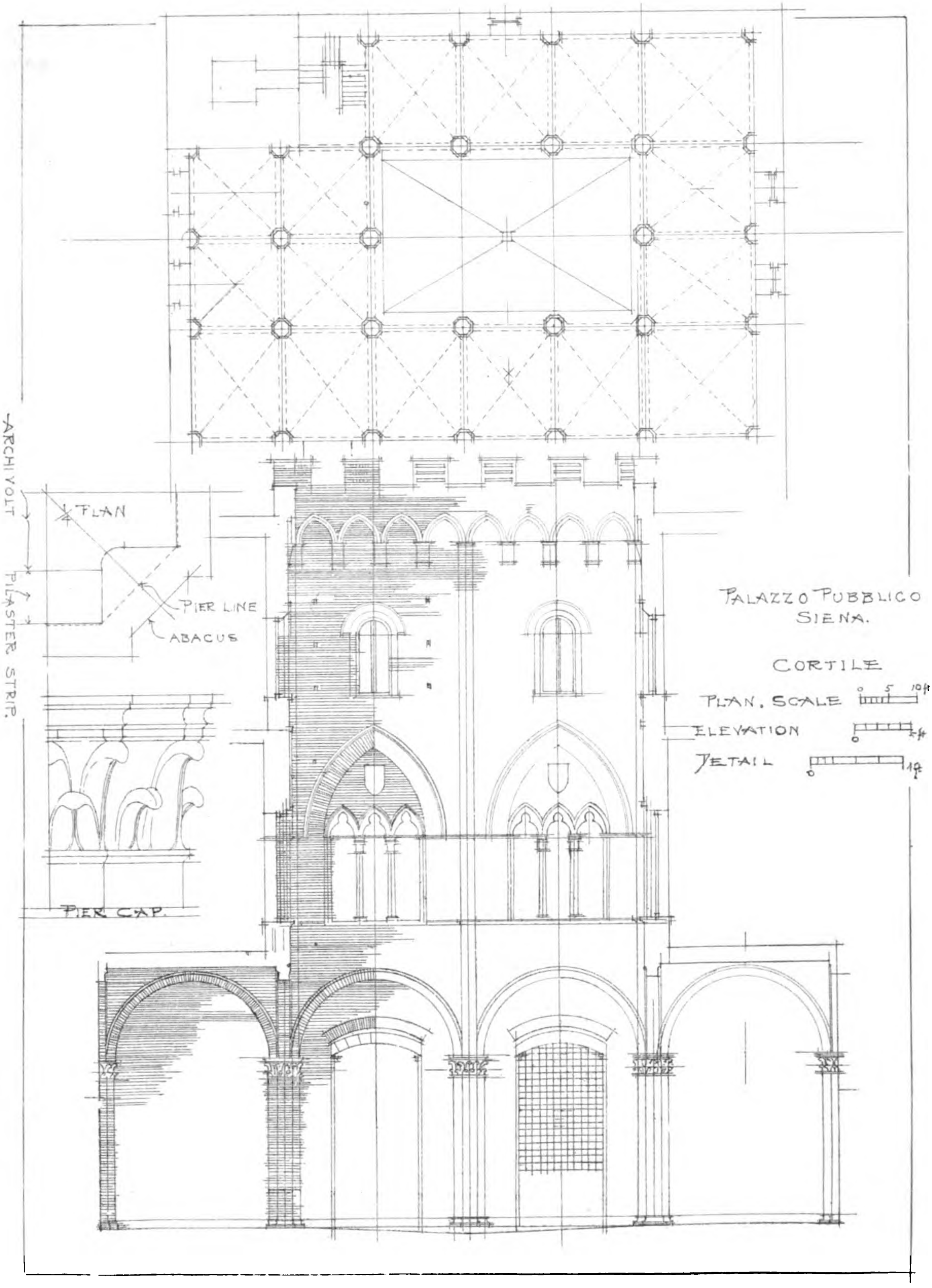
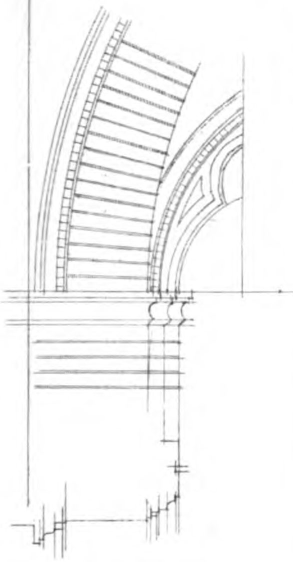
OF
ARCHITECTURE.


Plans of Belfries
Main Wall Below.
Plans of Shafts
The Towers of Florence and Siena.
Scale
0 5 10 15 ft.

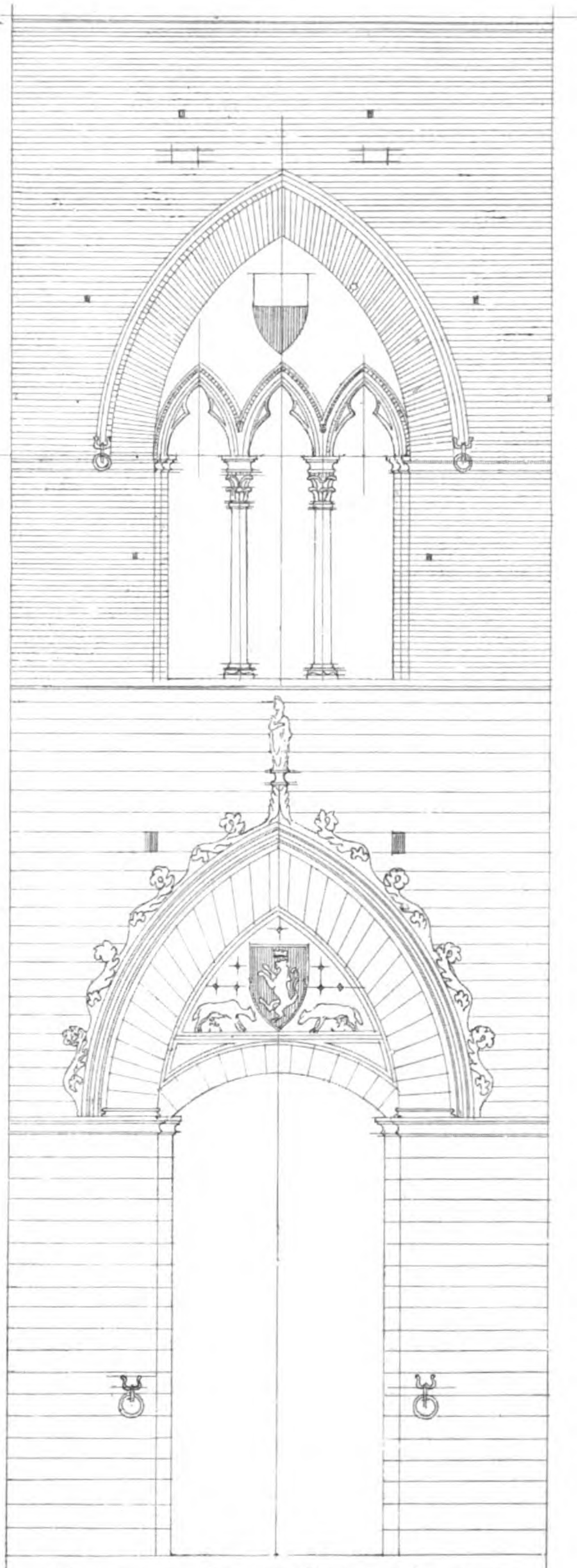
CORNELL UNIVERSITY AGRICULTURE COLLEGE


ARCHIVOLT
PILASTER STRIP
PLAN
PIER LINE
ABACUS
PIER CAP.
PALAZZO PUBBLICO
SIENA.
CORTILE
PLAN. SCALE
0 5 10 ft
ELEVATION
0 5 ft
DETAIL
0 1 ft

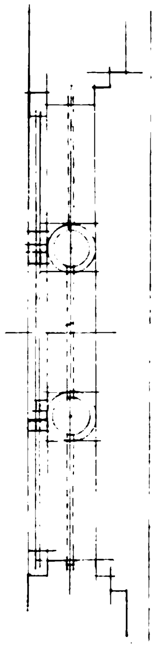
CORNELL UNIVERSITY · COLLEGE OF ARCHITECTURE



WINDOW DETAIL.
Scale 1 ft

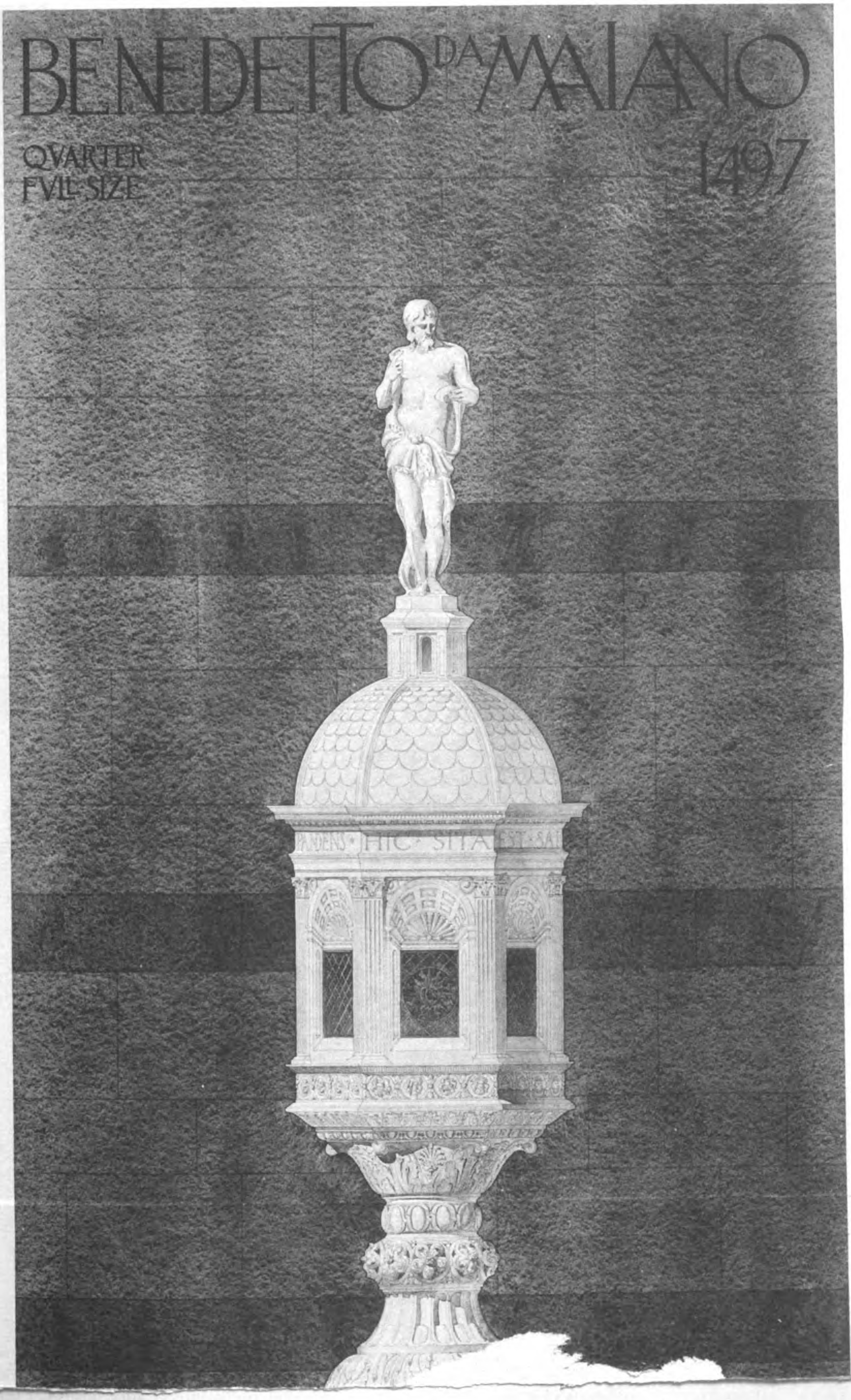


PORTION OF BAY OF PALAZZO PUBBLICO.
SCALE: 0 5 ft. SIENA.



PLAN THRO' WINDOW
Scale 1 ft

COLLEGE
—OF—
ARCHITECTURE,


BENEDETTO DA MAIANO
QVARTER
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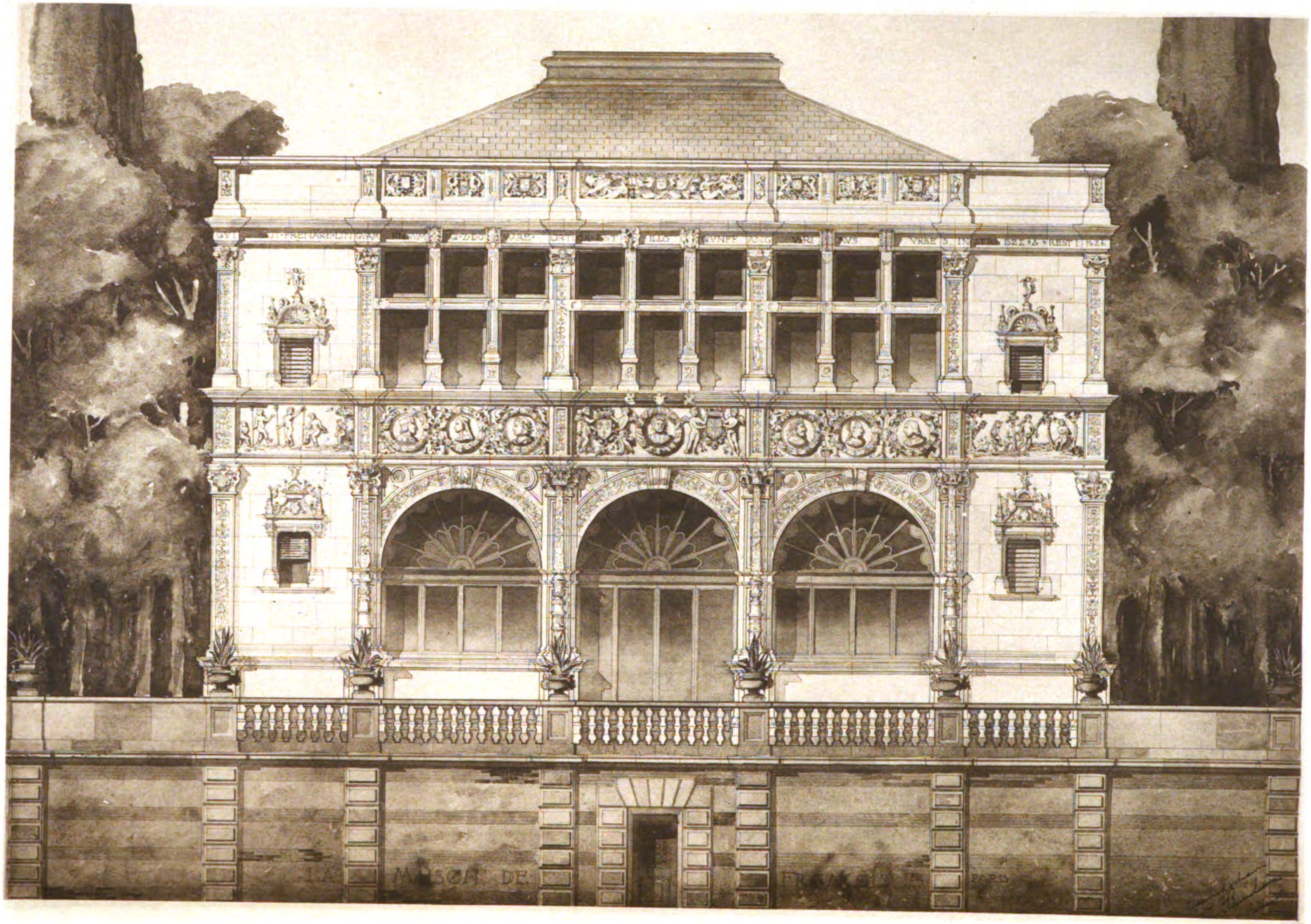

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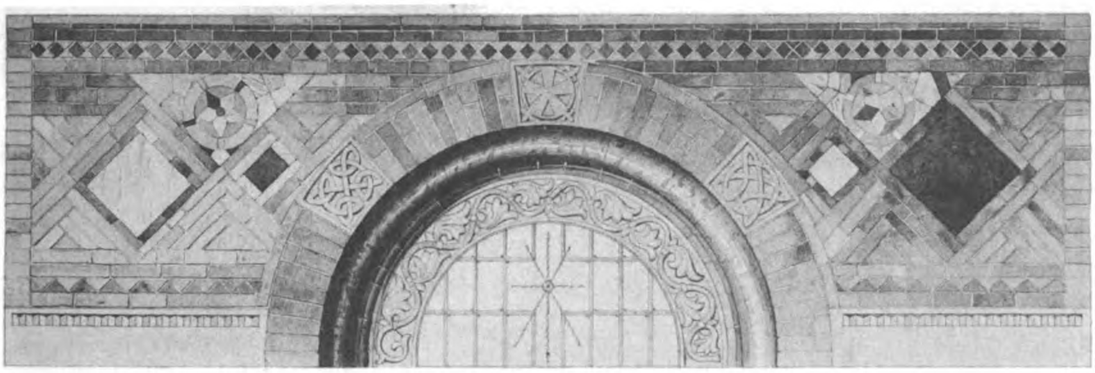

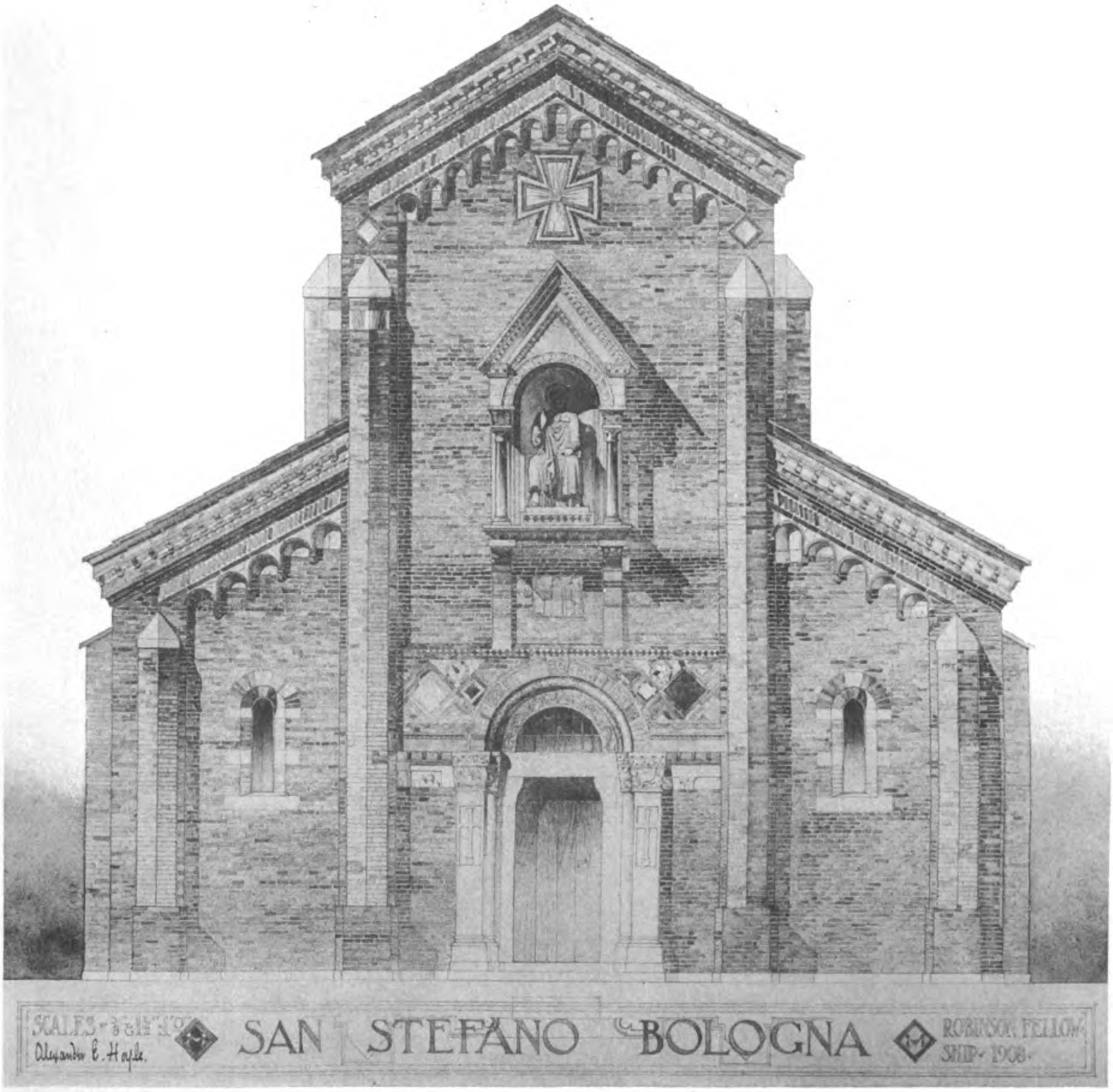

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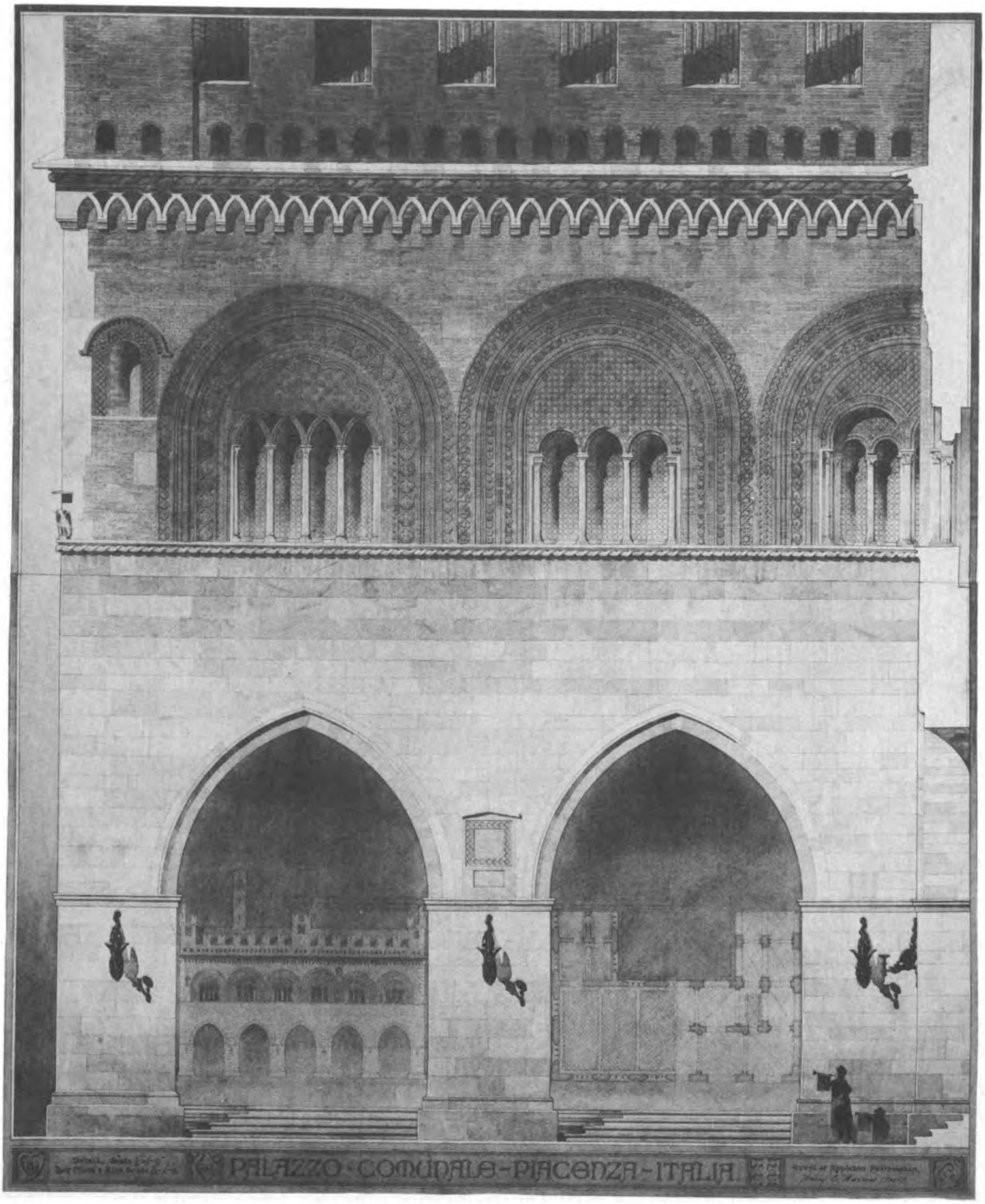

PALAZZO COMUNALE PIACENZA

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Architectural Quarterly of Harvard University.
March 1912.

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The Architectural Quarterly of Harvard University

June 1912

The Study of Architectural History H. L. Warren
Brunelleschi Howard Moise
Michelangelo as an Architect M. B. Gulick

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THE STUDY OF ARCHITECTURAL HISTORY AND ITS PLACE IN THE PROFESSIONAL CURRICULUM

H. LANGFORD WARREN

PROFESSOR OF ARCHITECTURE, AND CHAIRMAN OF THE COUNCIL OF THE SCHOOL

IN an extremely suggestive report of the Committee on Education of the American Institute of Architecture written by the late Mr. Henry Van Brunt, now some twenty years ago, he strongly urges on the profession and on the architectural schools the importance of the study of architectural history as a means of appreciating the fundamental principles which underlie design. He would "teach the whole course of history by the architecture which was a part of it" and would "pursue this study of history through its manifestations in architecture from archaic to modern times, or at least to the nineteenth century, not with the minute patient scrutiny of the archæologist, but with the spirit of the artist, seeking to learn how forms and ornaments were developed out of the genius of civilizations and peoples, and how, as they were significant of the progress of human culture in the past, they should be used in the service of modern art." He believed that this would lead to "practice, not with unreasoning prejudice in favor of this, that or the other forms of art, nor with the indifference of eclecticism, but with a sense of the deep significance of these forms to whatever era they belonged, as expressions of the history of our race, and with a conviction that decorative forms in historical architecture are not mere fashions or accidents of the times—but symbols slowly evolved by process of art from certain definite conditions of human life, as links in a continuous chain of evolution." A similar view is expressed by Mr. Russell Sturgis in the preface to his "European Architecture" when he says that if "archæological study has been unfavorable to the growth of natural and original design" it is "because the modern student of architecture, as an art to be practiced, has studied the superficial aspects of ancient styles rather than the essential nature of those styles." "It is to be urged as a remedy for the modern disease of borrowing and copying that the true nature of each favorite style of ancient art should be made more familiar to our practicing architects."

These views fairly well expressed the attitude of the more intelligent and thoughtful architects toward the study of architectural history and its value in the training of the practical architect: its study, namely, not for the purpose of being able to copy or follow with more or less accuracy the forms of this or that style, but for the purpose of really penetrating the underlying meaning of architectural form. Mr. Van Brunt's report urged upon the schools a more thorough and penetrating study of architectural history.

Of late, however, these views have been questioned in influential quarters. It has been claimed by some that the close study of architectural history tended toward archæological revivalism, and the schools have been urged to spend more time directly upon architectural design, and to give less time to architectural history, which was valuable, to be sure, as general information (the architect ought to be familiar in a general way with the past of his art), but which, it is said, had little bearing on the practical pursuit of design as a living art. In the great times of art, it is urged, craftsmen and architects worked out the vital problems of their day in direct fashion, caring little for the work of bygone times and in general ignorant of their artistic past. The modern architect should attack his problems in the same way if he is to produce anything vital, and need concern himself little with the past.

One might at once urge that some of the worst solecisms of our time, some of the most flagrant misapplications of historic forms, are the work of those whose knowledge of the history of architectural development is the most superficial.

There is however a solid basis for this recent contention. The whole question will bear re-examination, to determine, if we may, what real place if any the study of architectural history has in professional training; and, if it has such a place, what the aims and methods of that study should be.

We are led at once, in taking up this question, to approach it from the historic side. The argument is: since the great art of the past has been produced without a comprehensive knowledge of its past, since it has developed always directly to meet the needs of its own time, on the basis of that which immediately preceded, why should the practical architect of today be burdened by the study of forms which he cannot and should not use, since they do not meet nor express the need of his time? Why is it not enough—why is it not better—that he should concentrate his study upon design and construction, concerning himself only with the forms of the present, not confusing himself with the endless and intricate variety of the forms of the past?

There can be no question that this has been the successful mode of approach. That in all past time until the Renaissance,—from some points of view we might almost say until the nineteenth century,—architecture has been the work of men dealing directly and freely with the needs of their time. Unconcerned with and for the most part entirely ignorant of any art but that of their own day, they have freely and spontaneously moulded the forms of their inherited past to meet the changing needs and ideas of their present. Imitation of other forms of art has indeed constantly modified, sometimes even greatly diverted the current of the development; but the motive has never been imitation, it has always been creation: to meet in what seemed the best way the practical or ideal need and to give to it the most beautiful expression of which the artist was capable in the terms of his familiar and inherited art. In this way and under this natural impulse the forms of art have developed organically. The changes have always been the spontaneous outgrowth of circumstances, and the ideals have always embraced the whole generation of artists in any given time and region. Never at any time did any question arise as to what style should be used, never at any time was more than one style in use in any given region at any given period:—the style was always fixed, like the spoken language, in the tradition of the people, and like the language was gradually and insensibly modified to meet changing needs. So much was this the case that an old building however venerated could be added to only in the style of the time, whether it was a Greek temple like the Heræum at Olympia, or a Gothic church like the cathedral of Chartres. It is this fact that adds so much interest to the study of ancient buildings. The history of the time is built into the structure in a vital way.

It is of the essence of the matter to note also the methods by means of which this traditional art was carried on. The architect in the modern sense cannot be said to have existed. There was no such separation as exists today between designer and craftsman. If not absolutely the same, they had at least been through the same training, they had imbibed the same traditions, and worked side by side on the same buildings. The designer carried out the work as master builder in constant contact with the work itself as it grew under his hand.

The Renaissance changed all this. It substituted the imitative motive for that of spontaneous and constructive development. Its aim was to revive the glories of an admired past. The more nearly it could imitate, or thought it imitated, the work of Imperial Rome the more successful it regarded itself, and more and more it tended to copy certain aspects of the outward form merely and to produce an architecture of formulæ, of rote and rule, in place of one of spontaneous and vital growth. It produced great things; but its best work was done during the time when traditional methods still held sway, and the vital creative impulse was still strong enough to prevent the following of its aim of imitation with completeness. For the artist craftsman, the master builder, it gradually substituted the architect, the designer who made his compositions on paper which he turned over to others to execute under his general direction. Already in the fifteenth century the great scholar-architect Leon Battista Alberti maintained that it was beneath the dignity of the architect to carry out his own work. Since those days the artist craftsman has disappeared practically altogether, and the mechanic directed by the contractor has taken his place as workman, while the function of design is left to the architect alone.

The influence of the new motive—imitation rather than creation—led as we can now see almost inevitably to the architecture of formulæ which dominated the close of the eighteenth century and continued into the nineteenth. Less and less interesting the buildings became. Less and less expressive of individual character, the same formula was applied to buildings of all sorts. By the aid of these rules the amateur of taste often accomplished work as distinguished as that of the trained practitioner. One recalls their names: Sir John Vanbrugh the courtier and playwright, Lord Burlington, Thomas Jefferson. Indeed the best architects of this period, men like the physician Claude Perrault, Wren and Bulfinch, belonged to this class. We all know the pompous and formal and often ungainly vanities that resulted from the activities of lesser men.

It is not surprising that against this system of imitation, reduced to rule and applied with little discrimination to all sorts of problems, there was ultimately revolt, and that in sheer fatigue men turned for relief to other things. But tradition (except as expressed in these formulæ) was extinct, and perforce designers turned from one source of imitation to another. First it was Greece, imitated in the new enthusiasm that followed its virtual rediscovery. The simply treated colonnade is always dignified: and it must be confessed that the imitated Greek colonnades were productive of a dignity we sometimes envy. The colonnades of gateways, guard houses, theaters, museums and palaces in Berlin or Munich, the colonnaded church fronts of a Hittorff or a "Greek Thomson," the British Museum, the treasury building in Washington, the custom house in Boston, the sub-treasury in New York are for the most part buildings we should be sorry now to lose. But imitated Greek colonnades were not more vital or expressive than imitated Roman ones. The buildings named, and others less successful, were expressive of their time chiefly in showing how completely that time was devoid of real artistic power. The impulse of these buildings was archæological rather than artistic, and practically these buildings were as little adapted to their various purposes as they were little expressive of them. The whole movement of the Greek revival was a mere fashion, with no historic basis in the countries that attempted it, and as such it had its day.

The Gothic revival, which in England partly accompanied partly followed it, was at least based on more hopeful motives. It recognized that the great art of the past had been based upon artistic tradition. Its fundamental motive was to revive the submerged artistic tradition of England, and it may be said to have had the same sort of justification as the Renaissance architecture of Italy. It is curious, perhaps significant, to note that about the same interval of time (approximately two hundred years) intervened, between the last flickerings of the classic impulse in Tuscany at the end of the twelfth century and the revival of the classic forms (partly based indeed on eleventh and twelfth century prototypes) in the beginning of the fifteenth, and the last Gothic, which in England lingered in mixed and impure forms until toward the close of the seventeenth century, and its revival in the nineteenth. Indeed the Gothic impulse never quite died out in England, any more than the classic impulse ever quite died out in Italy. But the revived classic forms in Italy in the fifteenth century had this advantage over the revival of the Gothic forms in England in the nineteenth century: at the time of the Renaissance, though the motive was that of imitation, the methods were those of tradition, the potent impulse of the revival was creative rather than archæological; in the Gothic revival in England the method was archæological, there was little freedom, little invention, each design down to its last moulding had to be archæologically correct according to the period imitated. Such a method persisted in could lead to no vital results, and like other fashions the Gothic fashion ceded the field to still others. It did not however quite die out. It was presently taken hold of in a more vital way. There was a remarkable, if partial, revival of the craftsmanship upon which the traditional art had depended. The Gothic revival accompanied and partly expressed a notable religious movement, and so it has come to pass that, in church work and domestic work in England, and to an extent in this country, a new Gothic which shows much of vital quality and interest has developed. Its interest and its aim is no longer archæological. It is inspired by the ancient Gothic art of England, but it uses the old forms freely and creates others from them to express new needs and new conditions. It has created in these two fields some of the most interesting and some of the most promising work of modern times and, insofar as it has been successful, it has been enabled to do this by methods wholly modern, by a penetrating and exhaustive study of past art, which aims at the revival of principles rather than the copying of forms. Its occupation of the field is partial, and it seems that under our modern conditions several main artistic currents are likely to run side by side. Who can say whether they will ever coalesce so that from them will spring a single homogeneous art? Certainly they cannot, until our civilization itself changes its character and becomes simpler and more homogeneous.

In its endeavor to occupy the whole field, the Gothic revival in England was doomed to failure, even apart from the merely imitative and archæological motive which so long controlled its attempts. In England and in America imitation succeeded imitation. Every known historic style has been followed, in some cases with an ignorance nothing short of ludicrous.

Finally we have had—in the so called "art nouveau" and other similar attempts,—a recognition of the failure of the motive of imitation, of the inability of such a motive to produce any work which should have a really vital relation to its epoch. And so precedent has been thrown overboard altogether, and for the first time in the history of humanity we have seen great ability wasting itself in the impossible endeavor to invent a new style, to create out of nothing forms which should be expressive of our modern world. This, the most futile and ill-judged of all the artistic movements which in the field of architecture have followed each other in the last one hundred years, has produced in its various manifestations the most hideous monstrosities the world has ever seen: and yet this movement will prove to have had its value as a protest. It serves also to emphasize the condition of chaos which we have reached; but out of which there are not wanting signs that we shall struggle.

This brief survey of familiar facts seems necessary to our discussion in order to emphasize the utterly and radically different situation in which we find ourselves in architectural matters, as compared with all previous epochs. Our situation is unique. No such condition as that of the present has ever existed in the architectural world at any period. The imitative impulse which ultimately produced this condition was introduced by the Renaissance: but the Renaissance itself succeeded in establishing a quasi-tradition which did not exhaust itself until the close of the eighteenth century. Our situation differs from that of other epochs, not simply as one period has differed from another hitherto; but it differs utterly in kind from all other periods. So far as architectural development is concerned, the past up to the close of the eighteenth century stands on one side, and the nineteenth century up to the present stands on the other. A clear recognition of this difference seems essential to any fruitful discussion of the means to be adopted to secure an advance in architecture in the future, and this involves the question of the best methods to be pursued in the training of the architect. Never until the present has the world, or any part of it, found itself so completely without an architectural tradition as the Europe and America of today. Never until the present at any given time at any given place could any question arise as to what style should be used, as it almost necessarily arises with every building with us today, often dictating the choice of this or that architect who is known to favor this or that historic style. Every one interested in the subject is agreed that some way out of this chaos must be sought. But if we are to find a way out it must be by a clear recognition of our condition as it exists.

The art of the past depended for its strength on inherited tradition. The tradition once lost, the continuity of development in a very real sense broken, we cannot out of hand re-create that lost tradition. We begin to differ at once as to the desirable starting point. We cannot, if we would, go back to the naif indifference to and ignorance of the past which accompanied the great artistic epochs of former times. We cannot, if we would, escape the influence of all the art of the past which is brought to our doors and, as it were, thrust into our hands. Our choice lies simply between really knowing it and using it wisely in the fulness of knowlege, or knowing it only superficially and misusing and misapplying it ignorantly. It seems self-evident that since the whole position of architecture today differs radically from that of the past, our conditions demand a different training for the architect. It is neither possible nor desirable to revive for him the training of, for instance, the medieval craftsman-architect. The question seems to resolve itself into this: what can we substitute for our lost traditions? Or how can we go about the task of gradually building up such a tradition? How can we, in our present conditions, gradually create an atmosphere in which artistic development can flourish? It seems evident that it must be through making the most of these conditions, by drawing the utmost advantage from our vast accumulated knowlege of the past. We must seek to combine scholarship with artistic impulse and enthusiasm, must seek to give that impulse and enthusiasm the sure basis of knowledge. For the support which the architect of the past received from tradition, we must substitute scholarship. Not the scholarship which is concerned with facts merely, with archæological study of outward forms; but the scholarship concerned with principles, which studies the art of the great epochs of the past in order to understand if possible those fundamental qualities which made it great, which penetrates to the meaning of the forms used, which analyses and compares for the purpose of gaining inspiration, in order that it may create by following consciously the principles which are seen to have been followed unconsciously in the great art of the past, developing if possible by degrees a tradition out of what is best in all past form, because it understands what to take and what to modify in order to meet the conditions of the present. Such a scholarship, we may hope, will produce an art which will not, on the one hand, change a significant and established form merely for the sake of novelty; but which, on the other, will freely mould and shape form to meet more expressively new and changing conditions. All our schools of architecture recognize that practically, in spite of the revivals that have passed over us, we are still, so far as form-language is concerned, under the inevitable influence of the Renaissance. The teaching of design is founded, and wisely founded, on the study of the orders and the elements of simple classic form. There is a simplicity and directness in the best classic forms, as well as an excellence of proportion, which makes them, in connection with problems to which they properly apply, the best basis for the study of composition, and we are coming more and more clearly to recognize that these forms have an elasticity and an applicability which makes them the best basis for such a tradition as we desire to create. While the study of the past and the experience of the present make it clear that there can be no forward progress, no development of anything worth while except on the basis of accepted and tried forms as a starting point, it is also becoming more and more clear that the student and the architect need something more than the mere knowledge of those forms as a basis for design. They need to understand them. They need to know their meaning in relation to structure and their connection with the needs and ideals that first gave them birth.

We do not need to go back to the results of the dry and mechanical application of the classic formulæ in the eighteenth and early nineteenth centuries to see that a superficial knowledge of classic form leads to all sorts of hideous misapplication, to incongruities sometimes condoned by those who are content to note the correct following of certain types, but which are justly and pretty universally condemned even by non-professional critics of taste and judgment. Many of these faults and incongruities are due to the imitative motive introduced with the Renaissance, which inevitably led to the misuse of form; and if the contention of those critics who maintain that these incongruities are inherent in the Renaissance is not altogether justified, it at least makes clear that we need, especially in undertaking to apply these forms to the needs of our own day, to have our judgment and our taste guided and clarified by such sure knowledge of principle as can only come from a sound and thorough and painstaking study and analysis of the art of the past, and that if we are to base our forward progress on the precedents of the Renaissance those precedents, especially, need to be fully analysed if we are not to be utterly misled by them.

Do not these considerations make it clear that Mr. Russell Sturgis was wholly justified in his contention, that in so far as archæological study has been "unfavorable to the growth of natural and original design" it has been "because the modern student of architecture as an art to be practised, has studied the superficial aspects of ancient styles, rather than their essential nature"? And that he is right in urging, "as a remedy for the modern disease of borrowing and copying," a real familiarity with the true nature of the styles, and he might have added the true nature of style? It is another instance of the truth of the adage: "A little knowledge is a dangerous thing, drink deep or taste not the Pierian Spring." And yet it becomes also clear that it is not so much more study, as the right kind of study of architectural history which is needed. The right kind of study of architectural history will make it clear to the student, that the great architecture of the past has always developed in obedience to certain great principles which underlie the best work of all the styles; it will make clear to him that great architecture has always been produced as an expression of the needs of its own time, that form has developed as an expression of structure and through the working out by architects and craftsmen of the problems of their own day in direct fashion. He will learn to appreciate that form is significant only when so used, and that a living art can only be developed by working in this simple and straightforward manner. He will see that great design has always been produced by the frank treatment of each problem as it arises, that it has been produced by meeting first of all in the fullest way the practical conditions, and then by giving to the practical solution of the problem harmonious and beautiful arrangement, the design developing from within outward, the exterior form becoming the development and beautiful expression of the interior organism. As his studies go on he will appreciate more and more that only in such organic fashion can the best design be produced. The more he appreciates the significant beauty of the Greek temple, of the order of the Parthenon or of the Erechtheum, the more he will desire to apply the same directness of design, the same sensitive beauty of proportion and of form to his own work, and the less disposed he will be merely to copy the forms of the Greek orders. The more sensitive he becomes to the essential beauty of these forms and the more he realizes how these forms were produced, the more he will strive to work in the spirit of the old designers and the more repugnant it will be to him slavishly to copy what they have done. He will begin to realize in his own work the meaning of the saying "the letter killeth, but the spirit giveth life." Incidentally in this study of the past the student will be forming his taste by the intimate study of the finest things of all time. The formation of taste is clearly one of the most important tasks which the schools of architecture have to set themselves. If this is the object of the study of architectural history it becomes very clear that this object is not in any degree to enable the student to copy this or that form. It is not to be pursued with the object of enabling him to make tombs or banks like Greek temples, nor to build thirteenth century Gothic churches, nor to design salons in the style of this or that Louis. The study of the history of architectural development rightly pursued will serve, as Mr. Sturgis pointed out, as a preventive rather than as an encouragement to this sort of thing. Its purpose, for students of the practical art of architecture in our day, should be, that fundamental principles of design may be deduced and appreciated, that the essential conditions which produce great art may if possible to some extent be known, that the meaning of architectural form may be understood. Its purpose should be to show how these forms developed as the ideal embodiment of constructive principles, and as the expression of the civilizations that produced them. Such a study, it is clear, can be no superficial study. The forms must be thoroughly known if they are to be understood; and properly carried out this study in itself is a stimulus to the imagination, and should be a help in the practical study of design which must always occupy the dominant place in any well balanced architectural curriculum. The history of each period must be so far studied as to make clear the conditions under which and as an expression of which the forms came into being, so that the study of architectural history becomes the study of the history of civilization as expressed in architecture. Such a study, under the conditions that exist today, is essential to those architects who would be in any real sense leaders in their profession, who are ambitious to guide their art onward to higher things. Only by means of such a study can a clear realization of the underlying principles of the fine art of architecture be had, only by such a study of the conditions of success in the past shall we be enabled to see clearly the conditions of success in the future, only by the conscious application of principles thus appreciated can we hope to build again a vital artistic tradition, which will grow out of the present, but which will be firmly based on a full knowledge of the significance of the forms of the past.

BRUNELLESCHI, AND HIS INFLUENCE ON THE DEVELOPMENT OF RENAISSANCE ARCHITECTURE

A THESIS WRITTEN FOR THE COURSE IN THE
HISTORY OF RENAISSANCE ARCHITECTURE BY

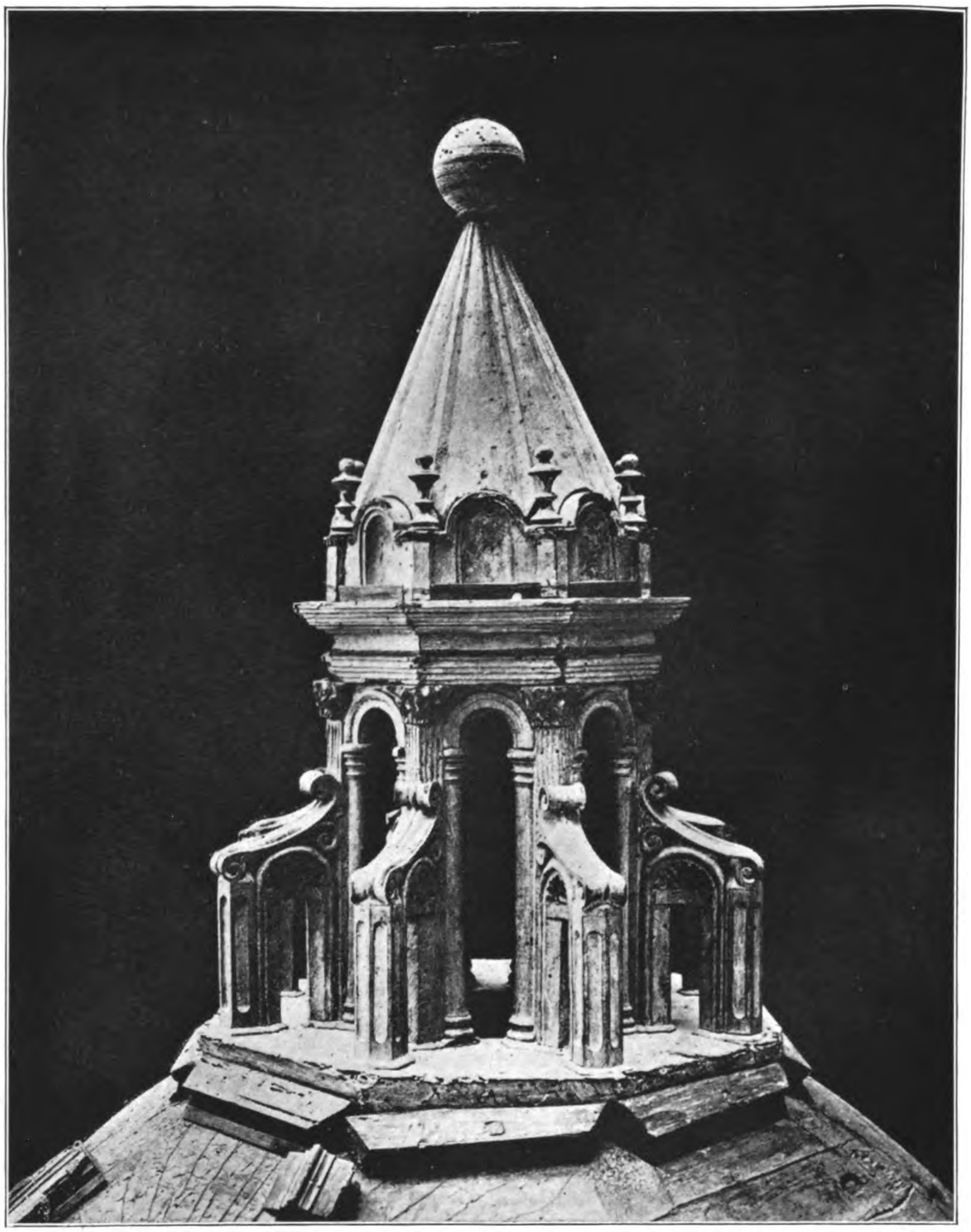
HOWARD MOISE
SPECIAL STUDENT IN THE SCHOOL OF ARCHITECTURE

THE architecture of Tuscany, at the end of the fourteenth century, had arrived at the end of an era. During the middle ages Italian architecture had suffered somewhat of an eclipse at the hands of the Gothic of France, for the shadow of that great development had fallen with not always happy results on the strongly classic traditions of the peninsula. Indeed it may be remarked that the phrase, "the Dark Ages," which, in its general use, has been so justly condemned, might yet with some show of fairness be retained in referring to the period of Gothic ascendency in Italian architecture. For, although this period produced throughout Italy many buildings of an undeniable, if somewhat exotic, charm, and in the North resulted in the exquisite beauty of Venetian Gothic, it was in general a dark age, for the reason that it was an age unillumined by the clear ray of structural intelligence.

The Gothic style was not indigenous to Italy. Brought from France by Burgundian workmen, its superficial forms had been grafted onto the existing Romanesque tradition through the caprice of fashion, and its structural significance was never understood. To the end its history was one of compromise, the classic tradition being so strong in Italy, and especially in Tuscany, that even in its mere external form, the Gothic style had only a partial victory. The classic striving for large, unbroken wall areas and spacious interiors was never lost.

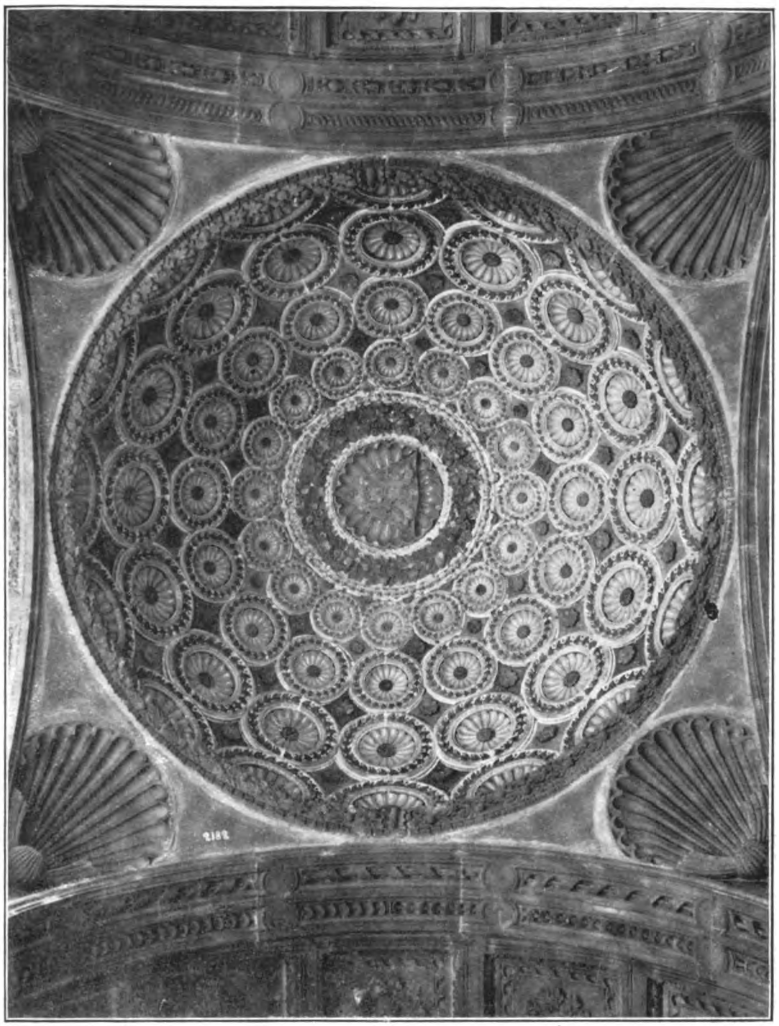
Toward the end of the fourteenth century, however, the first real glimmerings of the dawn of the Renaissance began to appear. The architecture, though still following Gothic lines, became more classic in feeling and detail, and in the sculpture the use of the nude and the grouping of the figures, recalling the reliefs on the Roman sarcophagi, show how strong was the influence of the work of antiquity, even at a time when the Gothic style still prevailed. This tendency is already shown in the thirteenth century in the pulpits of Niccolo Pisano, where cusped arches rest on Corinthianesque capitals, which, although they are treated with great freedom, show very clearly their indebtedness to classic models, and which carry a parapet whose sculptured reliefs show a marked Roman influence. Nevertheless the medieval note was still the dominant one, and though there was evident a certain unrest, a certain readiness for change, the transition was not to be effected except through the influence of a single strong personality. From the point of view of the succeeding period of the Renaissance, architecture, at this time, was in bondage to "the barbarous and Gothic" style of the North. Like Israel of old she was awaiting her deliverer.

This deliverer appeared during the opening years of the fifteenth century in the person of Brunelleschi.



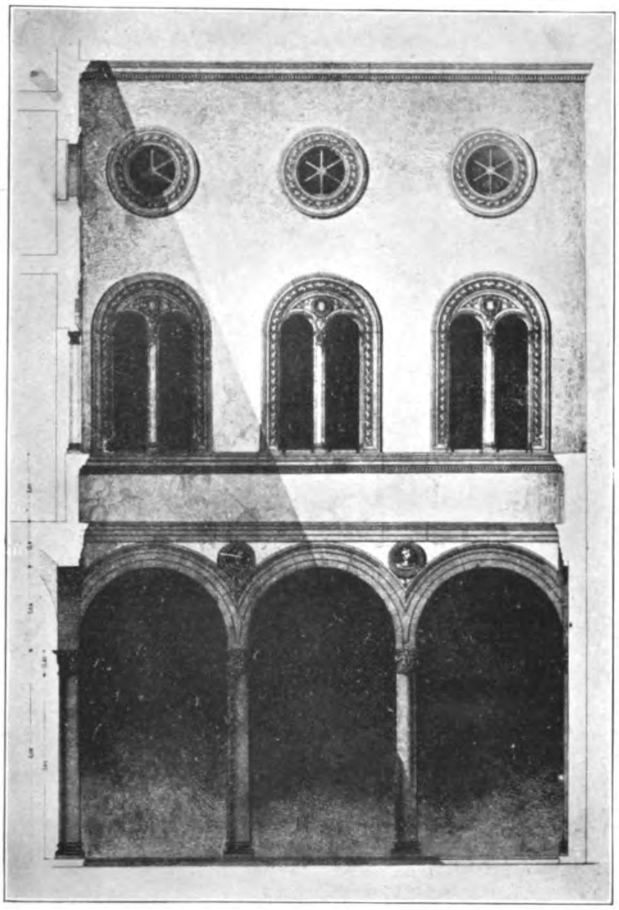
BRUNELLESCHI'S MODEL FOR THE LANTERN OF THE CATHEDRAL OF FLORENCE
FROM GEYMÜLLER'S *Toscana.*

Filippo di Ser Brunellesco was born in Florence in 1377. He came from a family of unquestioned respectability, his father being a notary, and there are records which seem to prove that his mother was even of noble blood. At any rate his birth, and the influences surrounding his childhood, were somewhat better than was usually the case among the craftsmen of the period; and his education, though it was early interrupted, was also along more liberal lines. His father's desire was to make of him a notary, but Filippo evinced so deep an interest in the arts, and so great an ability in mathematics, that he finally persuaded his father to his own point of view and was apprenticed to a goldsmith. In 1398, having accomplished his apprenticeship, he was admitted to the Guild of the Silk-Weavers, in which guild the goldsmiths were enrolled.

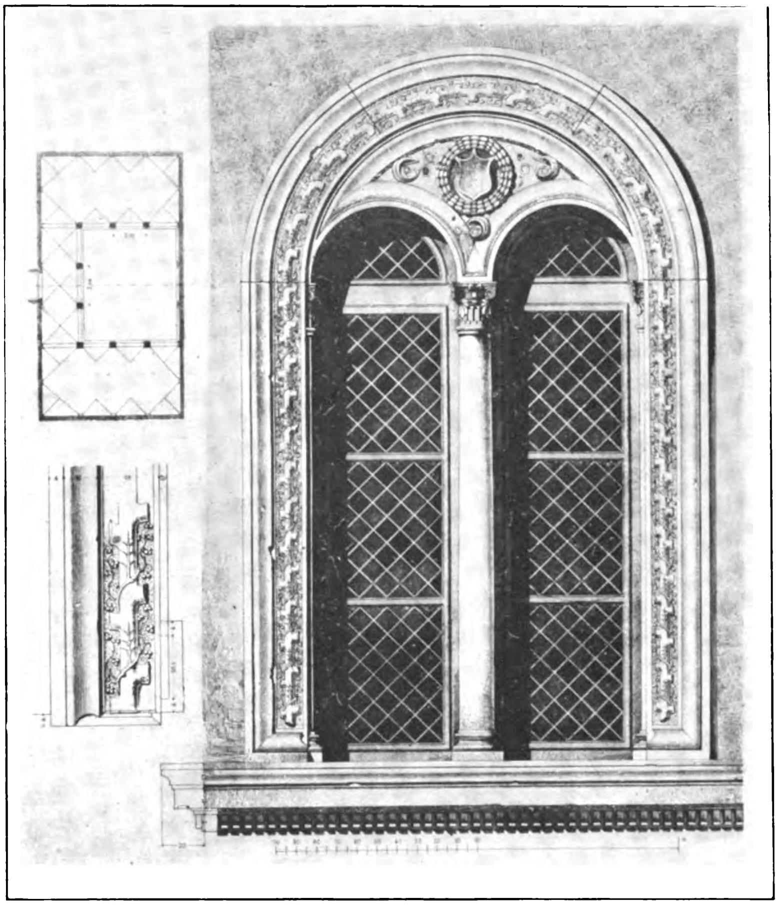


FAIENCE DOME, PORTICO OF THE PAZZI CHAPEL, FLORENCE

Brunelleschi's personality was one of interesting contrasts. Vasari tells us that physically he was small, homely and ill-proportioned; but he cannot have been altogether an unimpressive individual. His forceful personality shone out through his keen eye and the striking features which we may still see in Cavalcanti's bust. His qualities of mind more than made up for his physical defects. He knew somewhat of Latin and was thoroughly familiar with the literature of his time. He was singularly clear-sighted in his reasoning and fair in his judgments. He was gifted to an extraordinary degree in constructive ability and was a remarkable mathematician in spite of his meager education. Above all he was gifted with the sense of beauty. These attributes, in combination with a powerful imagination and with great originality, in his case made genius, and Brunelleschi was not unaware of the fact. His qualities of appreciation and fair-mindedness did not fail him in estimating his own worth, and consequently his whole career is characterized by self-assurance and firmness of purpose. He was reserved and self-contained, lived his life very much alone, and doubtless his long struggle against the stupidity, distrust and injustice of his chief clients, the Board of Works of the Duomo, tended to make him somewhat misanthropic. He was frank, though just, in his criticism of others and their work, and in consequence was undoubtedly a man of few friends but good ones. Chief among these was Donatello, the sculptor. His friendship with Donatello was perhaps the most important note in Brunelleschi's personal life. He seems to have been unusually free from sensuality—his temper even tending somewhat toward asceticism—and he was never married. To this friendship, then, which began in his youth, he must have devoted most of the warmth of his affection, and in return he must surely have been influenced by Donatello, although the latter was a number of years younger. And we may imagine that this genial, buoyant and lovable character did much to soften Brunelleschi's naturally cold and severe nature.


SECTION THROUGH THE COURTYARD, PAZZI PALACE
FLORENCE
FROM RASCHDORFF'S *Palast Architektur Toscana's.*

Brunelleschi's professional life, from the view-point of the historian, begins with the competition for the Baptistery doors, which took place in 1401. The award of this competition to Ghiberti was an event of great importance in the career of Brunelleschi, since it was—at least partially—the cause of his determination to go to Rome and devote himself to the study of architecture. He appears at first to have been actuated in this resolution by a mere desire to triumph over his rival, in some other branch of art if he could not do so in sculpture,—at least Vasari holds this view. This explanation seems, however, inadequate. Pique may have been responsible for his going to Rome, but it could hardly have served as an impetus for such a thorough and rigorous course of study as he pursued during the years that he and Donatello, and later he alone, spent there. Brunelleschi, as has already been stated, was somewhat familiar with Latin literature and was thoroughly saturated with the literary and philosophic spirit of his time. The Renaissance was not, of course, a movement confined to architecture, or to any one of the arts. It was a reformation of the whole intellectural and social fabric, which affected not only art, but all of the thought and manners of the time. And as is always the case in such a movement, its first

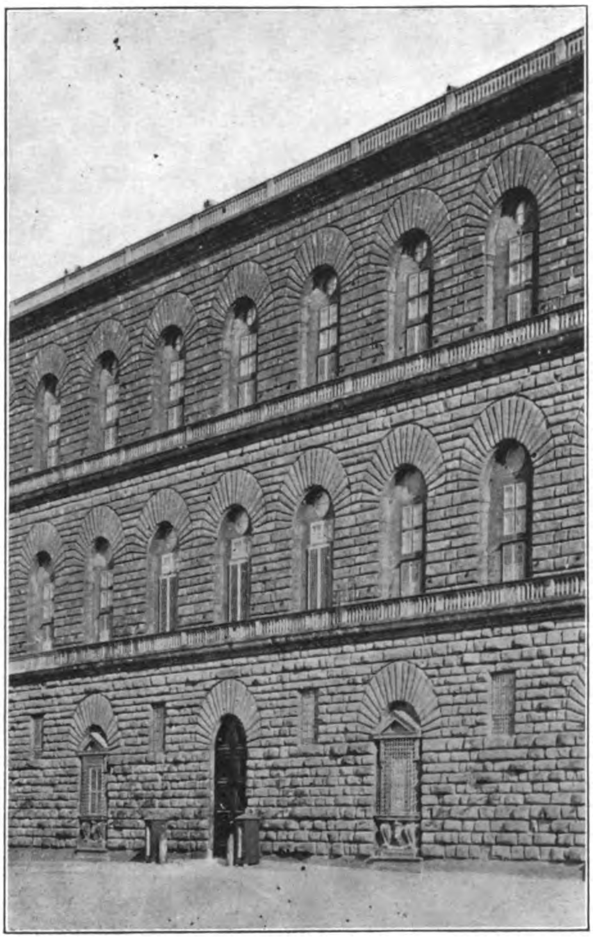


WINDOW IN THE COURTYARD, PAZZI PALACE, FLORENCE

FROM RASCHDORFF'S *Palast Architektur Toscana's.*

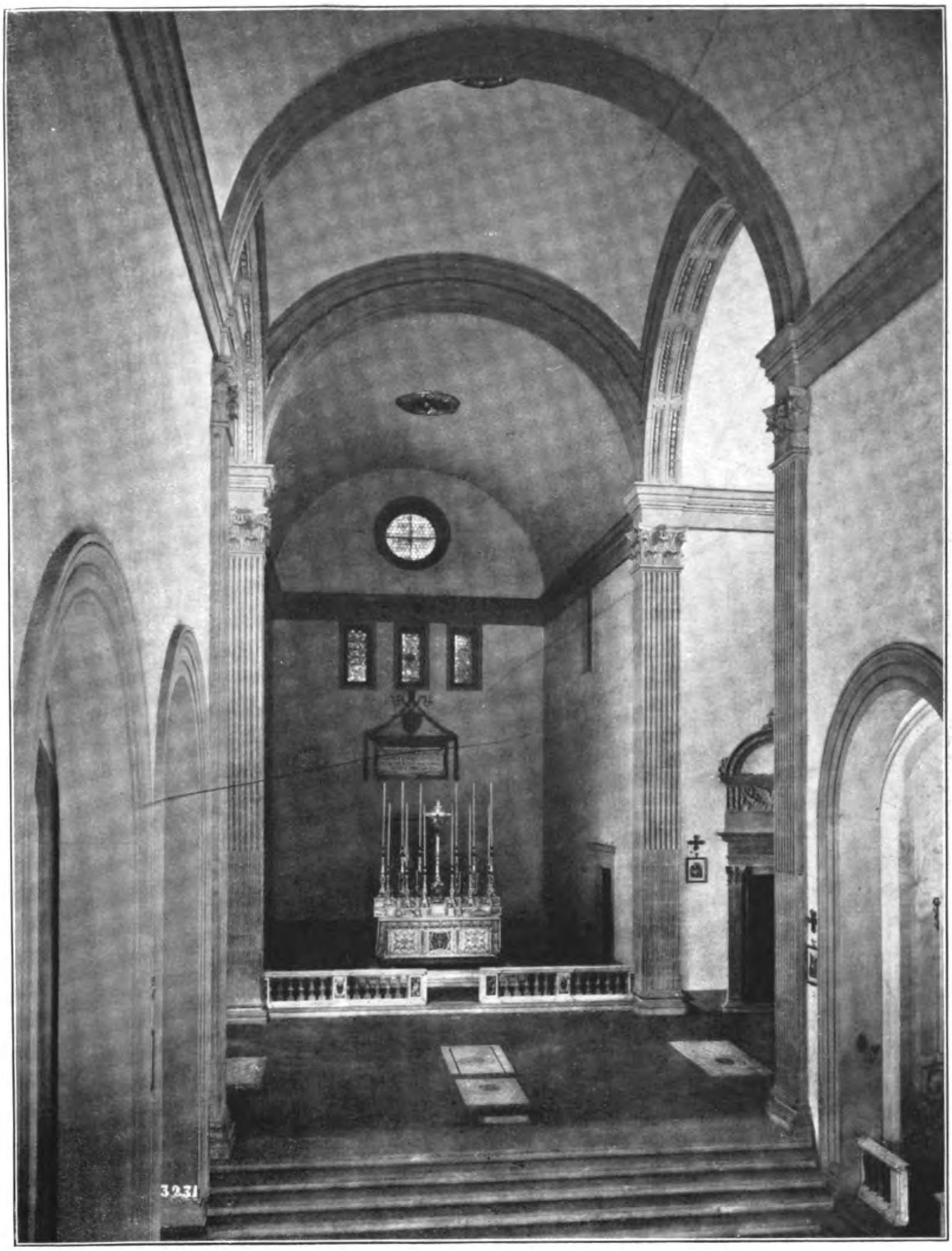
expression was in the spoken words of the people and its next in literature—"art," so called, being the last to feel its influence. Italian literature, during Brunelleschi's youth, was already infused with the spirit of the Renaissance, and it was undoubtedly this influence, rather than a desire to outshine Ghiberti, which guided his arduous studies in Rome. He seems, moreover, early in his career, to have felt the importance of his mission, and to have consecrated all his efforts to its accomplishment.

And what were the achievements which resulted from so much patient preparation? The building of the dome of the Cathedral of Florence was undoubtedly Brunelleschi's greatest personal triumph, and it still stands perhaps the greatest and most beautiful monument to the genius of a single man that architecture has produced. The dome also has its place in the development of the architecture of the Renaissance, since that movement was not alone concerned with a reversion to the use of the classic orders. The treatment of the dome was one of its most vital problems. The dome of Santa Maria del Fiore is first of all a great esthetic and constructive triumph. Brunelleschi was not without models for its construction, and aside from our knowledge of his careful study of the Pantheon at Rome, the dome of Florence shows clearly in its construction its designer's indebtedness to the existing medieval dome, or rather octagonal cloister vault, of the Baptistery. This in no wise detracts from the splendor of Brunelleschi's achievement, as the very size of the undertaking makes it remarkable, aside from the fact that no such structure had been built within the memory of Brunelleschi's contemporaries. The praise for its beauty and esthetic perfection is Brunelleschi's without qualification. It is neither in its construction, nor in its beauty alone, however, that its importance in the history of architecture lies, but in the fact that it is raised on a high drum, and that the dome itself is allowed to show exteriorly, instead of being enclosed and roofed over as in the case of the Baptistery. It may be contended that it would have shown a greater architectural advance had this construction been a true dome rather than an octagonal cloister vault, but this seems hardly a fair criticism of its designer, since it is quite possible that Brunelleschi would have built a circular dome, as he did in several other buildings, had not the existing structure made the octagonal form the natural solution of the problem. The use of the drum and the disclosing on the exterior of the domical form constitute an important step in the development of the Renaissance.


THE PITTI PALACE, FLORENCE
SHOWING THE PART DESIGNED BY BRUNELLESCHI

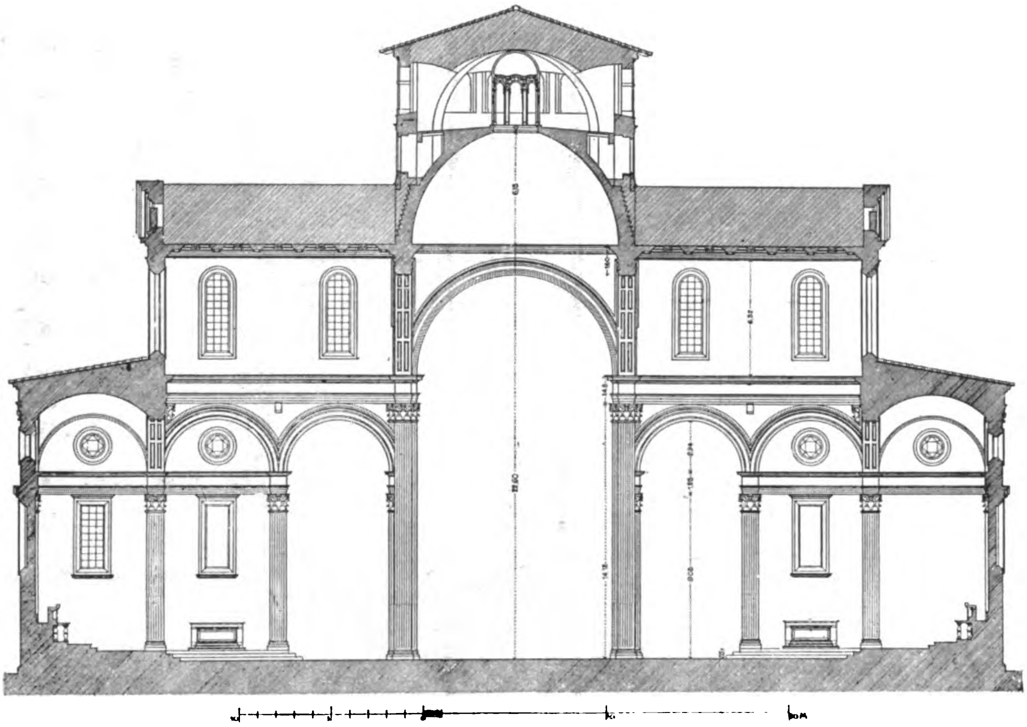
But far more important in this development were Brunelleschi's lesser works, which he carried on during the years in which the dome was slowly being brought to completion. It seems hardly necessary, in this connection, to undertake a chronological résumé of the various buildings which were designed wholly, or in part, by Brunelleschi, with detailed descriptions of each one; but rather to point out the contributions which his work as a whole made toward the establishment of the new regime.

Among these contributions the introduction of the classic orders undoubtedly deserves first place. Brunelleschi, in his study of the antique, had familiarized himself thoroughly with the proportions and character of Roman remains, but it is nevertheless remarkable that, first explorer as he was of the ancient world, he should have imbued his work so thoroughly with the classic spirit. He did not, however, allow himself to be fettered by any hard and fast rules of proportion, but used the orders with the utmost frankness and freedom, in whatever manner would best effect the solution of the problem in hand. Nowhere is this more clearly exemplified than in the chapel of the Badia at Fiesole. Here Brunelleschi has used Corinthian pilasters to mark the angles of the crossing, but they are far more than ten diameters high, and they do not carry a classic



THE CHURCH OF THE BADIA FIESOLANA, NEAR FLORENCE entablature at all. Instead they are surmounted by a high plinth or facia with a slightly projecting group of crowning mouldings, in which the corona is reduced to a mere fillet, the whole being admirably designed as an impost for the crossing arches and the barrel vaults of nave and transepts.

In San Lorenzo and Santo Spirito—basilican churches with aisles and nave separated by arcades—the arches rest on a Corinthian order, in which the classic entablature has been retained, but even here the projection and height of the cornice has been greatly reduced, so that its function of impost is well expressed. This use of a block of entablature over the columns of an arcade is one of the few structural illogicalities which we find in the work of the early Renaissance, which was, on the whole, far more consistent and structural in its design than the Italian work of the Gothic period; and this feature itself was undoubtedly due to the continuance of medieval precedent, as much as to a return to Roman form. In the two churches just mentioned, Brunelleschi, while retaining the traditional basilican plan, has nevertheless completely changed the character of the design, the transformation being simply effected by the use of the classic orders, by the substitution of round arches for pointed, and by the infusion of classic feeling into the detail.

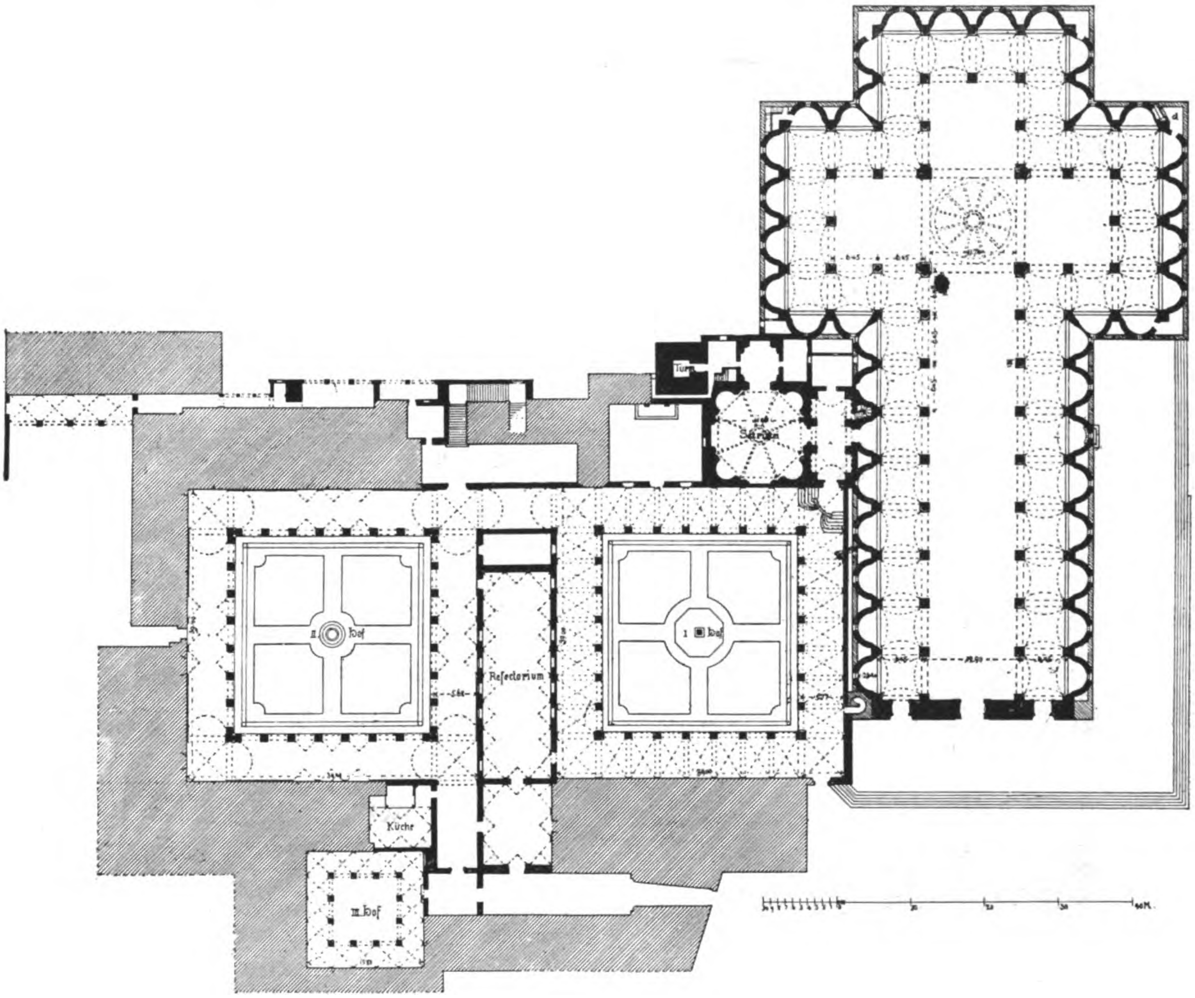


SECTION THROUGH THE TRANSEPT, CHURCH OF SAN LORENZO, FLORENCE

FROM GEYMÜLLER'S *Toscana.*

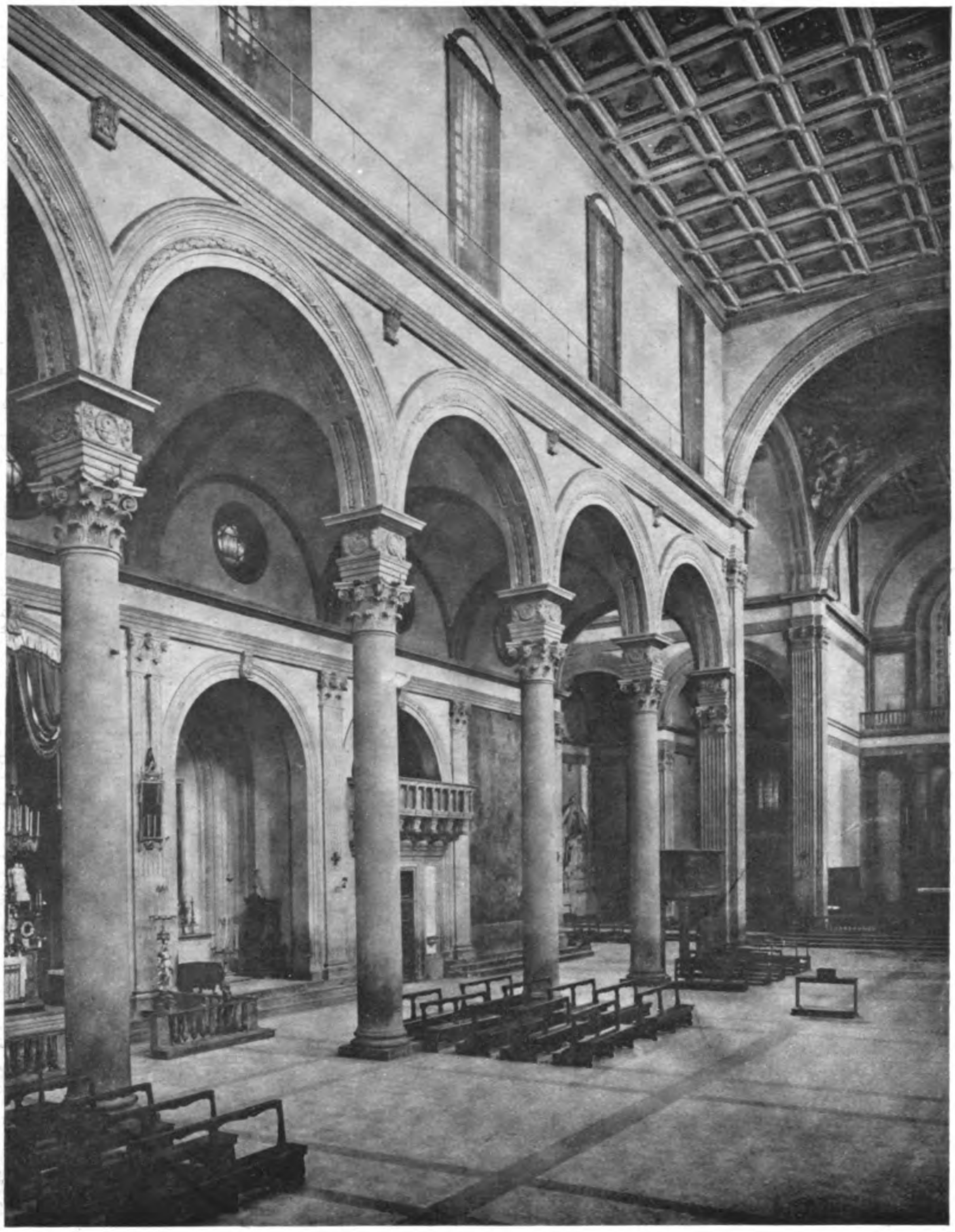
The buildings of Brunelleschi, again, are the first in which we find that conscious study of proportion, which is so important a characteristic of the Renaissance. Nothing is left to chance. On the contrary we frequently find some arithmetical or geometrical rule to have played its part in the design. In the façade of the Pazzi chapel Brunelleschi has apparently made use of the rule of proportion which is so splendidly used in the west front of the Cathedral of Paris.

Another of Brunelleschi's contributions to the dawning Renaissance was his treatment of domed interiors; for if the cupola of the Duomo is the only instance in his work of the *featuring* of a dome exteriorly, he has left many examples of domed interiors—the Pazzi chapel, the old sacristy of San Lorenzo and the crossings of San Lorenzo and Santo Spirito being cases in point. All of these domes are built over square compartments, the four arches of which carry the dome on pendentives. Brunelleschi was, however, a pioneer in the field of dome design and his work but blazes the trail along which Bramante eventually carried the dome treatment to perfection. In these early examples the pendentives are invariably allowed to come down to a feather edge over the point of spring of the arches, and in the case of the crossing domes the arches themselves intersect and merge into each other before they reach their common point of support. It could hardly be expected, however, that perfection in so new a field could be attained in the work of one man, and moreover, the small scale of the domes in question makes these defects less strongly felt than would otherwise be the case.



PLAN OF THE CHURCH AND MONASTERY OF SANTO SPIRITO, FLORENCE
FROM GEYMÜLLER'S *Toscana.*

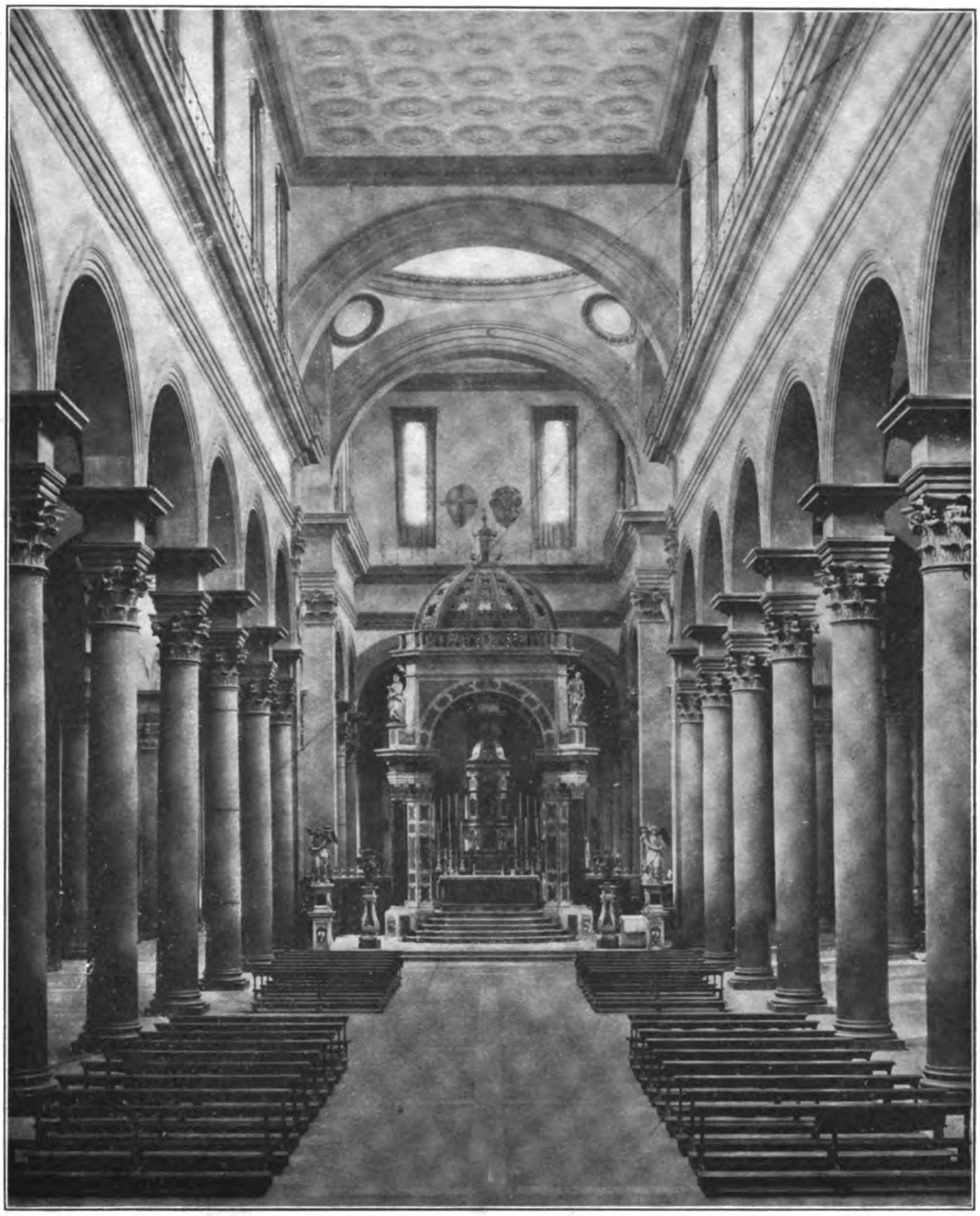
The design of the Tuscan palace is no less strongly stamped with the personality of Brunelleschi. In the Pitti and the Pazzi palaces, he laid the foundations for all subsequent palace building in Tuscany. The heavily rusticated basement story, the gradation in the rustication and in story height in successive stories, the string courses marking the sill lines, which though composed of elements of the classic cornice are nevertheless designed perfectly to express their function, the window treatment with the coupled arches under a great arch, the treatment of the courtyard with the arcaded basement story—its round arches resting directly on columns of a modified classic character—all these features, which are the salient characteristics of Tuscan palace design in general, are to be found in



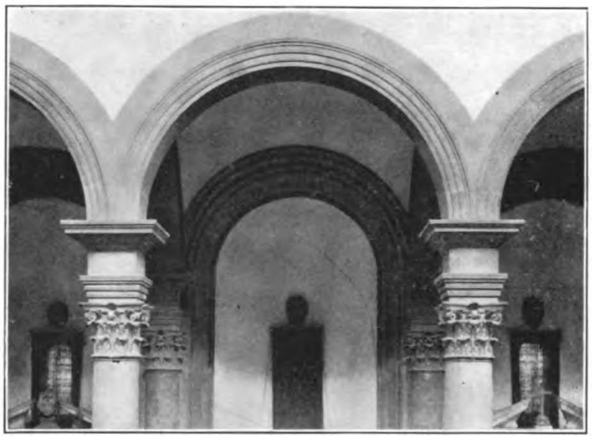
THE CHURCH OF SAN LORENZO, FLORENCE

one or the other of these two palaces of Brunelleschi. And in all the history of the Tuscan palace, no example possesses greater strength, dignity and justice of proportion than the Pitti palace of Brunelleschi's original design, nor can any show greater refinement, delicacy and charm than the Palazzo Pazzi.

Though Brunelleschi's importance in the development of the architecture of the Renaissance rests chiefly on his treatment of the church and the palace, and on his contributions to the development of the dome, there are, nevertheless, a number of other designs from his hand which display, perhaps to an even greater extent, his originality as a designer and his genius as an artist. The lantern of the Duomo, and the Hospital of the Innocents are in this category. The lantern,



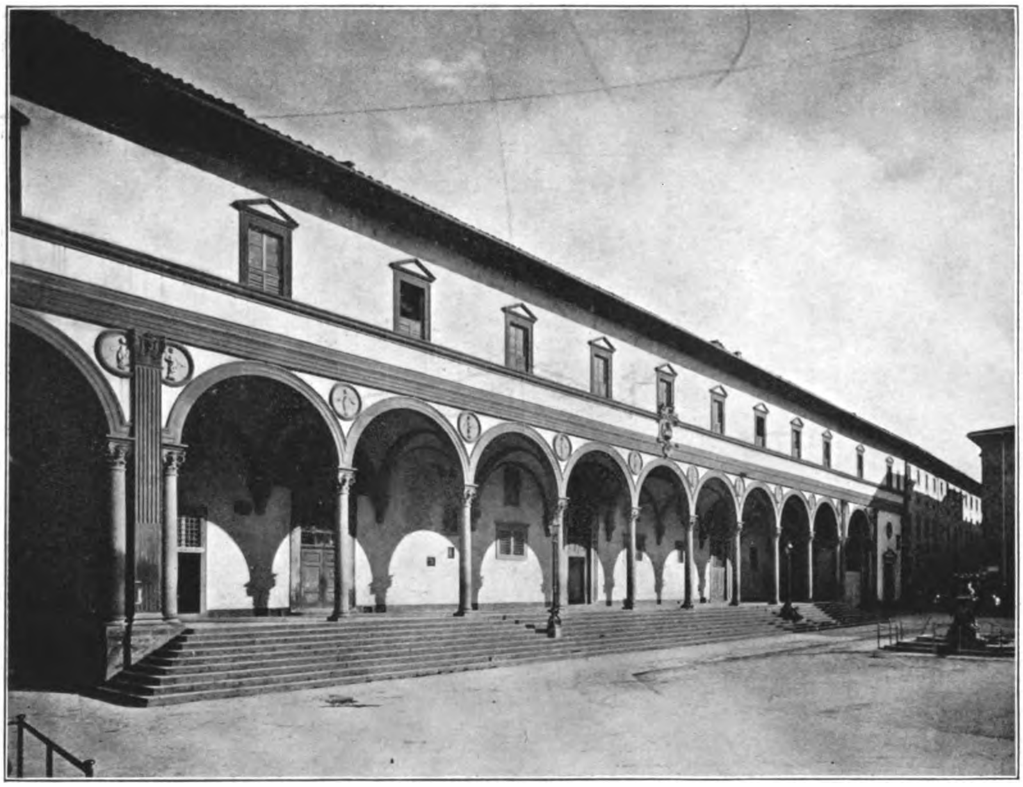
THE CHURCH OF SANTO SPIRITO, FLORENCE



NAVE ARCADE, CHURCH OF SANTO SPIRITO, FLORENCE

which was not completed until after Brunelleschi's death, but for which he left complete models and careful specifications, displays great originality of construction, combined with a wonderful feeling for scale, composition and line. The first of the long series of lanterns of the Renaissance, it is one of the most beautiful, and aside from the way in which it continues and terminates the line of the dome, one cannot but admire the perfect balance between its horizontal and its vertical lines, and the freedom with which it combines classic and medieval traditions, echoing the admixture of classic and medieval elements in the dome and the great structure below.

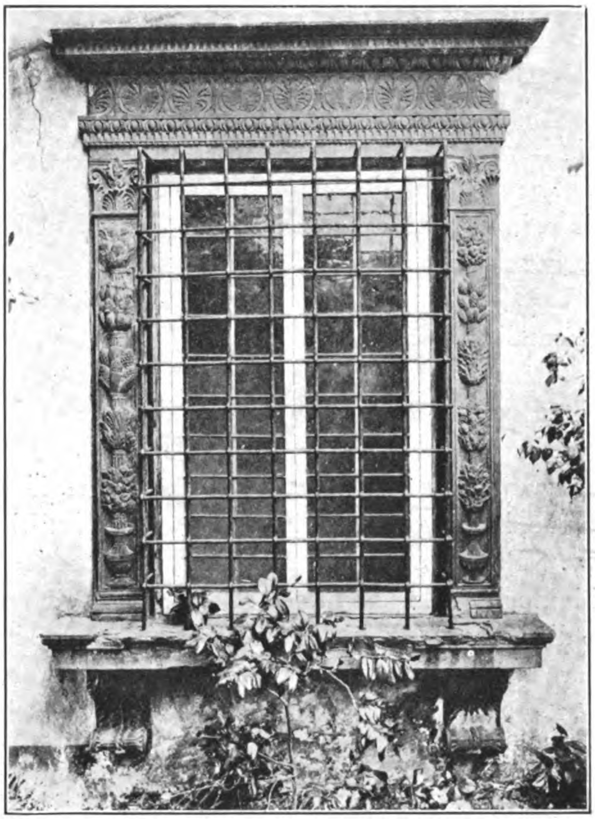
In beauty, the Ospedale degli Innocenti is hardly inferior to the lantern, its design being one ot great charm and refinement. And yet its chief interest to the architect lies in the fact that in its design Brunelleschi was solving an entirely new architectural problem. Public institutions were not an attribute of the middle ages. Seclusion and even fortification had characterized the building of



THE OSPEDALE DEGLI INNOCENTI, FLORENCE

the monasteries, which are perhaps the nearest approach to public institutions of this character which medievalism presents, although their chief function was that of an asylum for the ills of the spirit rather than of the flesh. Wherefore the greater praise is due to the genius of Brunelleschi, who, while using the monastery plan as a basis for his design, by the introduction into his façade of the great open loggia with its broad and hospitable flight of steps, expresses, in the building itself, the new spirit of charity and humanity to which it owed its origin.

The influence of Brunelleschi, then, is to be seen in the design of the dome, in the introduction of the classic orders and architectural motives of antiquity, in the treatment of the palace, and in the planning of public institutions. But most important of all is the witness which his work bears to the possibility of using the classic orders and details with freedom and structural propriety, of combining a frank meeting of requirements with a harmonious and significant expression of function, of reconciling utility and structural truthfulness with beauty.



WINDOW FROM THE BADIA FIESOLANA NEAR FLORENCE
FROM GEYMÜLLER'S *Toscana.*

MICHELANGELO AS AN ARCHITECT

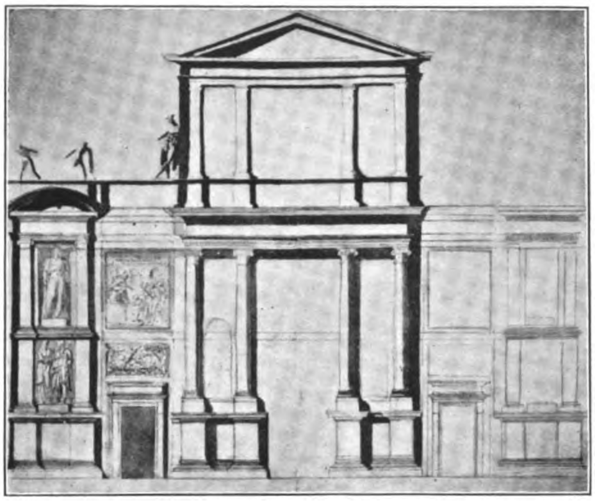
A THESIS WRITTEN FOR THE COURSE IN THE
HISTORY OF RENAISSANCE ARCHITECTURE BY

M. B. GULICK
HARVARD COLLEGE '13

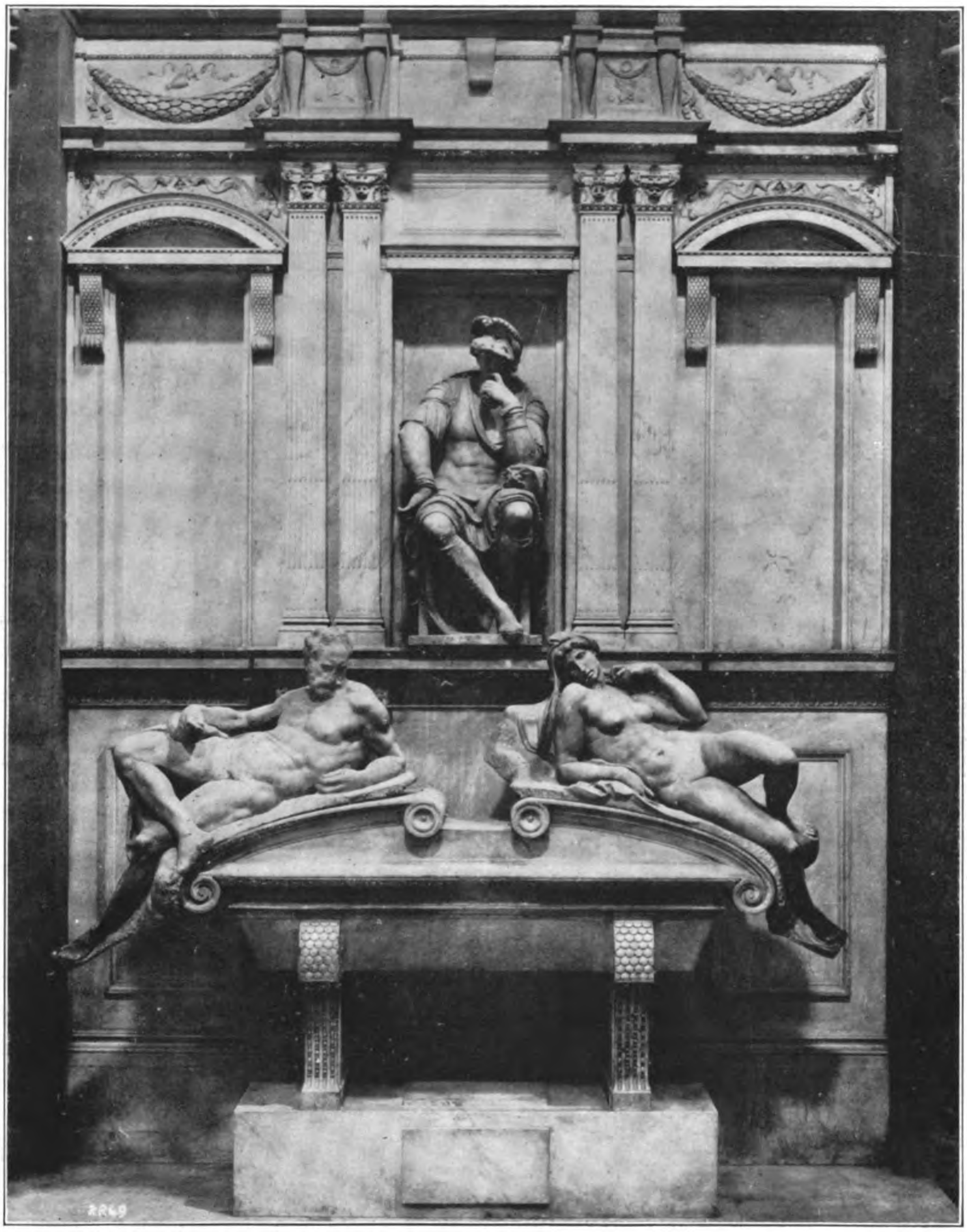
MICHELANGELO'S greatness as a personality and his immense artistic influence make it unusually important to consider the work of his contemporaries in order to point out what that influence was. The period in which his life fell, and his character as a man both affected his work as an artist. In the first place his life included the last years of the Renaissance, while his spirit was very far indeed from being in sympathy with the times. In the second place, had he been absolutely an artist, and only that, he might have been content to mirror the conditions of his time, as did most others, not only expressing those conditions in their works, but living them as intensely as possible, in the fashion of Benvenuto Cellini. Michelangelo, on the contrary was bitterly at variance with the immorality and oppression of the sixteenth century in Italy, and in his work as an artist, profoundly as that work was influenced by the conditions under which it was produced, expressed intensely his own views.

Raphael died in 1520; the few buildings certainly designed by him, marking the culmination of the Renaissance (the Cappella Chigi, the Villa Madama, the Farnesina, the Palazzo Pandolfini) had all been completed within a few years after his death; so, too, had the best works of Peruzzi, the artistic heir of Bramante, who died in 1537. Perhaps the best known and ablest architect living when Michelangelo did much of his architectural work was Antonio da San Gallo the younger, who died in 1546. San Gallo's work, as we see it in such buildings as the Palazzo Farnese, the Palazzo Spada, and the first story of the church of Sta. Maria di Loreto, shows a much stricter following of classical precedent than did any previous designing. From the days of the freedom and spontaneity of Brunelleschi, we see the gradual evolution of what appears here in its full development. Alberti in San Francesco at Rimini, and Bramante in the Tempietto of Ferdinand and Isabella, show the most salient points of this growth; the orders became more and more essential and mechanical; antique precedent became quite requisite. Such was the character of San Gallo's design for St. Peter's in the detail, with an added impracticality as to the dome which would have been equally impossible to an engineer or to an early craftsman. San Gallo was, however, as I have said, the best architect of his time, and his minor contemporaries followed with even greater assiduity, the scholastic turn which architecture was taking. Into the midst of it comes the work of Michelangelo, giving a peculiar twist to artistic development, interrupting it, and starting a secondary school in direct opposition to that of the classical formalists, who so dominated the current designs. It was thoroughly in keeping with Michelangelo's character to abhor a rigid subservience to any rule ancient or contemporary. He was probably less influenced by precedent than any other artist has ever been, and he was equally unaffected by the works of fellow artists and by those writings on architecture which came to play a greater and greater part in design, and which did so much to further the development of formalism. Let us not, however, blame him for wilful and unreasonable eccentricity, for revolution is just as surely a part of the growth of any art after its prime has passed, as any preliminary or culminating phase. A profound religious faith and a deep absorption in philosophical abstractions, led him to admire in works of art, bigness and noble suggestion, and simplicity, big or small, as in the dome of the cathedral in Florence and in the little church of San Salvatore al Monte, by Cronaca. His own life of austerity perfectly embodied his views, a sincerity which doubtless did much to strengthen the influence of his works.

The façade of the church of San Lorenzo had never been built after Brunelleschi had stopped work on the church, and Pope Leo X, shortly after his accession in 1515, instituted a competition for the design thereof. This competition was won by Michelangelo, most unfortunately, as it now appears, for nothing was ever done of the actual building and the sculptor spent years in the preparation of the designs and in quarrying marble at Serravezza. This was the extent of the patronage accorded to him by Leo X "the patron of the arts." There remain some studies, presumably by Michelangelo, for this façade. In the Accademia di Belle Arti in Florence is a complete wooden model, for many years attributed to Michelangelo, an attribution now discredited by Geymüller and others. The model shows two Corinthianesque orders, engaged columns in the first story, pilasters in the second; there are two wings and a central bay over which is a low pediment. Each story has a full entablature, but there is not sufficient dominance given to the upper one to finish the building satisfactorily. The most striking thing about this design is its flatness, the feeling of the wall surface is kept to a very marked degree by the even and skilful distribution of the spots of decorative paneling, drawing the eye equally to all parts of the façade. In the Museo Buonarroti is a study for the same façade, with a two storied central bay much like that of the model, but with Ionic capitals in the first story; there are two wings of one story each, with sculptured figures sketched on top, making the transition to the higher central bay. In neither



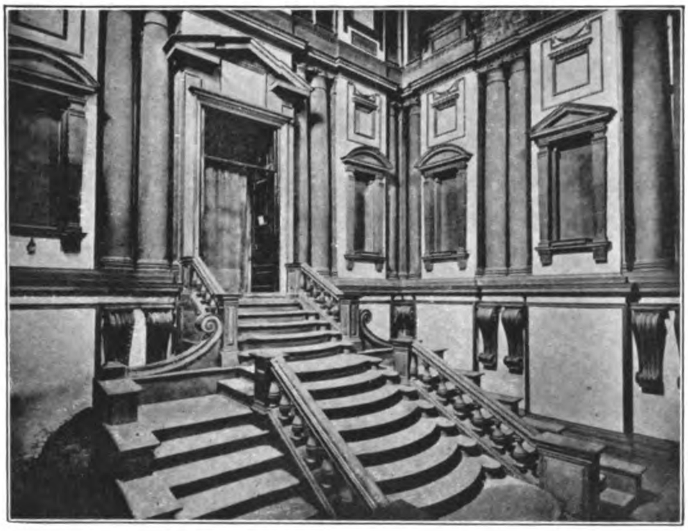
STUDY FOR THE FRONT OF SAN LORENZO, FLORENCE of these designs is there any striking departure from precedent except in some slight details—a window in the model—and they take about the same position in reference to his real architecture as the faun's mask and other early studies do to his characteristic sculpture. They do show, however, the only examples we have of Michelangelo designing in the purely academic traditional way; had the panels been sculptured as was intended, and the monotony thus further removed, the result would undeniably have been fine, but could never have expressed the artist's mind as did his later, fiercely revolutionary designs.



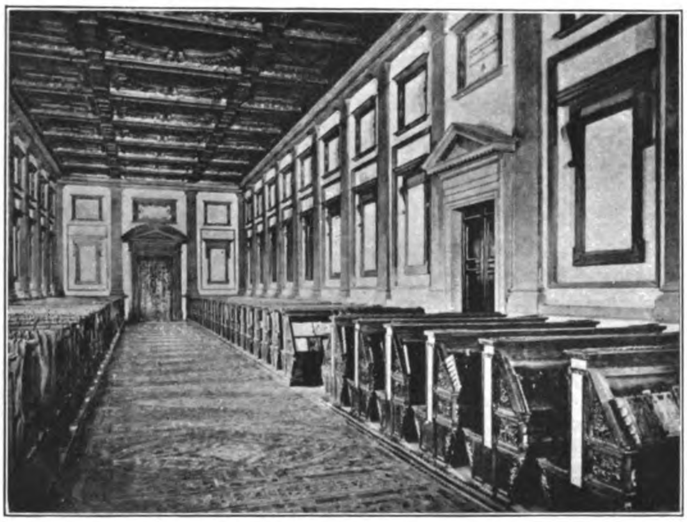
MONUMENT OF LORENZO DE' MEDICI, DUKE OF URBINO.

The commission for the building of the Sacristy of the church of San Lorenzo was given to him in 1520, a little later probably than the designs for the façade. It was to contain the tombs of Lorenzo and Giuliano dei Medici. The plan simply repeated that of Brunelleschi's sacristy on the opposite side of the church; the architectural treatment likewise had to follow that of the older sacristy. As the designer intended, the cold white wall spaces, strongly contrasted with the dark stone pilasters and cornices, were covered with frescoes which have since been whitewashed. The most characteristic features of the interior, apart from the tombs, are the windows in the great arches above the second pilaster order. These windows, narrowing toward the top, supported on small corbels, with other corbels to support the cornice from which rises a segmental pediment, are the first definite challenge that the sculptor threw into the camp of the conservatives. These features became a part of his architectural vocabulary, and were, moreover, adopted and further developed by the subsequent designers of the Baroque, to whom this reveling in eccentric novelty was a basic principle. The tombs show two characteristic architectural features, the segmental supports of the allegorical figures, and in the attic the slender balusters supporting only two small blocks. The bases of the pilasters in the tombs have a heavy moulding of two astragals above the upper torus, which is cut in half, a scotia below, then a cyma, and a torus at the bottom; they are peculiar variants from the usual thing in bases, and seem to have been thoroughly thought out by the artist, to judge from the large number of sketches in the Casa Buonarroti. Beside the tombs are doors, with blank window frames above in which the entablatures and mouldings are broken in a riotous fashion. The blank window frames and other features which decorate and do nothing are to be found in every architectural design by Michelangelo, and illustrate an important point in his attitude toward the art. Here are elements which tradition had always associated with a structural purpose; window frames were invented for the edges of openings in a wall, and no one ever used them for any other purpose; Michelangelo, without scruple fixed them to blank walls where real windows would have been useless, but where he felt a painful void if the surfaces were left unmodeled; to gain the desired variation in surface he used the traditional forms of Italian architecture, wielding them with vigorous if startling effect. When he carved a statue out of marble, the very nature of the process made every inch of surface varied; being a great sculptor he used this characteristic with consummate skill, and realized at the same time, that the main elements of the design must be so compact as to leave no weak and erratic projection. Designing a façade was like designing a statue to him, he left no surface unchanged, yet kept the main features so well in hand that he produced such richly modeled and surprisingly flat walls as that of the upper story of the court of the Palazzo Farnese. Not being properly an architect, he failed to realize the structural fact that a building, consisting of flat walls, may be left simple and unmodeled where there is no structural demand for variety and gain thereby the greatest beauty from its truth.

Michelangelo's next architectural commission was the Mediceo-Laurentian library in Florence, built to house the great collection of manuscripts owned by the Medici family. In this building we see more distinctly the characteristics which caused Michelangelo to be called the "father of the Baroque;" all the specific features here used we have seen before, but in this instance they are used with decidedly less skill than in the earlier examples, and the smallness of the scale was also unfavorable to the success of the design. The library consists of a vestibule with a flight of steps leading to a great hall which is the library proper. The walls of the vestibule are paneled with strips of dark stone in such a way that one wonders how Michelangelo could have so admired the simple beauty of Cronaca's little church, and so have failed to comprehend its principles as to be unable to gain that same simplicity in his own designs. The wall is divided into bays by coupled columns, of strange half-Tuscan character, embedded in the wall in curious niches; they are in two stories, with a basement in which the lines of the columns are repeated by great corbels carrying nothing and used only to produce spots of desired shape and size. In the wall-spaces of the first story are window frames; again the blank windows, here with a crowning feature of a swag between two small blocks at the corners of the frames, forms which are fully developed Baroque—mere excrescences from false architectural features created for the purpose of decorating a wall surface. The stairway shows an early use of the curved line in large planning; it starts in three parts, the two outer runs stopping half way up and turning into the main run; the individual steps are curved in plan as well as the outer lines of the whole flight. The doorway at the head of these stairs is, one might say, a precursor of the Porta Pia in its elaboration of parts. The frame is broken out toward the bottom, the entablature interrupted by a large square panel, and the pediment broken toward the apex. The library itself is a room of great length with a very beautiful coffered wooden ceiling, the general design of which is by Michelangelo. The wall is divided into bays by a series of great pilas-

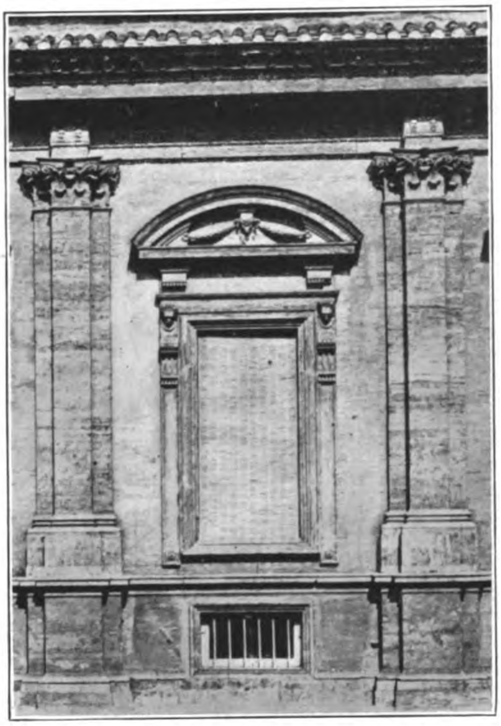


VESTIBULE OF THE LAURENTIAN LIBRARY, FLORENCE



HALL OF THE LAURENTIAN LIBRARY, FLORENCE ters which carry the ceiling on an entablature; the bays of the wall have two blank window frames each, one over the other. The most striking characteristic of this building is the evident fear of leaving a wall space undecorated, a feeling which led to the more elaborate bad taste of Michelangelo's imitators, to whom his evenly decorated walls were a complete license to bedeck a wall anywhere and everywhere with tawdry carving, the profusion of which quickly led to stupid vulgarity of form. The precedent for that sort of thing is to be found here in the library where the decoration is allowed to become prominent in itself, and does not hold to the wall. It shows that Michelangelo was "out of scale" in small interior design; to his last days the power of arranging a great façade never left him, as is evidenced by the design for St. Peter's; but, in this small interior, his strange innovations are too prominent.

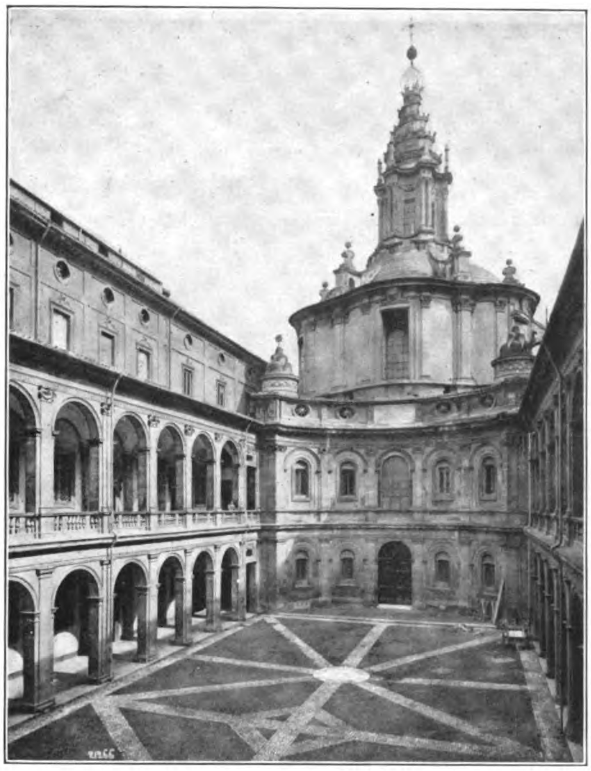
About 1530 Antonio da San Gallo the younger began work on a great palace for Cardinal Farnese; the building progressed slowly and the cardinal became Pope Paul III. About 1540, the palace being only partially completed, the Pope instituted a competition for the design of the great cornice, although the original architect of the palace was still alive. Among the numerous competitors was Michelangelo, probably at the express command of the Pope, for he seems to have been thoroughly ashamed of the whole proceeding. He refused to go to see the Pope himself, but is said to have sent his design by the hands of Vasari. His design won the competition, but he was so reluctant to commence work on what he felt belonged to another, that the building was stopped entirely until after San Gallo's death in 1546, when it was taken up again and completed from Michelangelo's design. It is thought that, at this time, Vignola was associated with Michelangelo, and it has been suggested by Letarouilly that he was probably largely responsible for the design of the great cornice. It seems impossible exactly to determine the truth; Vasari and Condivi are obviously prejudiced in favor of ascribing everything good to Michelangelo, and other sources are vague; it is quite certain from the authentic drawings in the Casa Buonarroti that Michelangelo was thoroughly familiar with the best classical precedent in the matter of cornices, and is equally true that he generally scorned precedent quite heartily, while the cornice of the Palazzo Farnese shows all the features of an orthodox Renaissance cornice. It is also thought that San Gallo completed the exterior of the palace up to the third story inclusive, except the cornice. It is rather difficult, however, to think that Michelangelo did not have some influence in the design of the third story; the accepted scheme of the superposition of the orders is changed, and an Ionic put over the Corinthian of the second story; these columns stand upon coupled corbels instead of the usual pedestal blocks, the window frames are arched without imposts, the columns carry only pieces of entablature, and over the arches the cornice is reduced to a mere string. All these features contrast so strongly with the conventional work below as to make the influence of Michelangelo seem quite possible. The great window in the second story over the door is said to have been by him. The great cornice is one of the finest of the whole Renaissance, a fitting crown for the colossal palace which it adorns. In the courtyard, the part of the design due to Michelangelo is quite certainly known; if it were not known by documentary evidence it would still be perfectly apparent, for the artist has signed it with extravagant flourishes in the design itself. Indeed it would be difficult to imagine a more perfect embodiment of what Michelangelo did to change the architecture of his time than in the façade of this great palace court. The two lower stories are in the fashion of the times, and in the best of that fashion; the Roman arch order is used with faultless accuracy in two stories—the Tuscan and Ionic; a typical balustrade runs along the top of the first story cornice; the arches of the second story are walled up and pierced with a series of irreproachable windows; the proportions are admirable, and the whole thing is complacently proper.


UPPER STORY OF THE COURTYARD, FARNESE PALACE, ROME

The third story shows at a glance the work of a rebellious spirit; instead of the engaged columns of the two lower stories there are Corinthian pilasters, each broken into a full central pilaster with a half pilaster on each side; the entablature is broken out over each central pilaster up to the bed-moulding, and the dominance of the upper cornice is obtained, not by greater projection, but by greater height and richness of decoration. In the wall spaces are windows of characteristic form, having all the eccentricities of those blank frames in the library with the addition, however, of an entirely separate segmental pediment, supported on corbels. The general effect of the third story is very fine, the increasing richness from the bottom story up is maintained and is given a distinctive value by being made the means of dominance of the third story over the others. The question of the beauty of the detail is more debatable; the double pediments over the windows are an illogical feature, though without their additional play of light and shade, and attraction to the eye, it seems that the design would distinctly suffer. The broken pilasters, which gave an unfortunate precedent to the later architects, are altogether admirable here, and serve to increase rather than diminish the sense of flatness of the wall—the same characteristic that we have seen in all the large designs. It must have required a great effort of will for Michelangelo to refrain from undertaking this commission in the first instance, the great size of the building made it so congenial to his love of bigness!

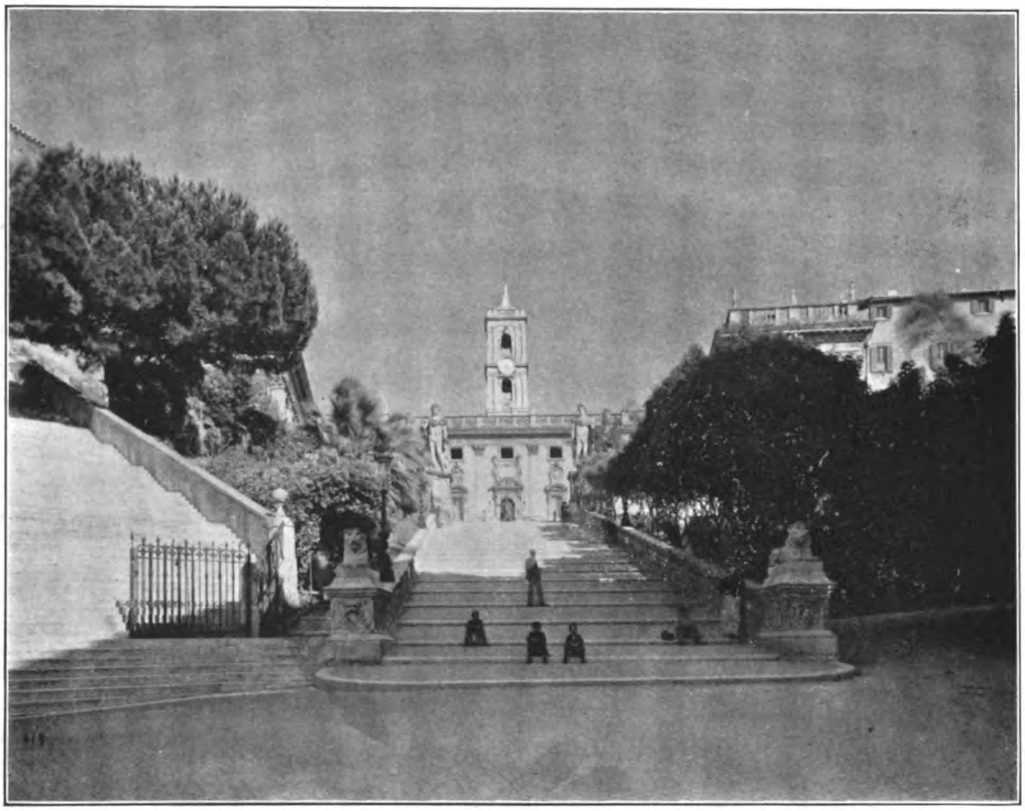
The Collegia della Sapienza in Rome, is perhaps based on a design of Michelangelo's. It was carried out, however, after his death by his admirer Giacomo della Porta. The only important architectural features are the court and the chapel at one end of it. The court shows no peculiar Michelangelesque elements; there is a conventional two-storied Roman arch order, Tuscan in the lower, Ionic in the upper story. Della Porta is to blame for the detail, and has much to answer for in this building, and more elsewhere, considering the ugly

Ionic capitals with swags connecting the volutes, and the coarse, heavy carving. The passage is groin-vaulted and does not run around the end of the court toward the chapel, where there is a large exedra with the orders applied decoratively. In the main part of the court there is a third story, set back over the main building wall. The plan of the chapel is extraordinary and may be due to Michelangelo. It is rectangular, with one end cut into by the exedra, leaving a square in which the circle for the dome is inscribed; out of this circle open six large semi-circular niches, so large as to be almost contiguous at the main circle, and leaving six small and nearly equidistant points on which the dome rests. The chapel is marked on the outside by a lofty tower of oval plan and very ornate design, the work of a much later architect. It was built about 1650 by Borromini.



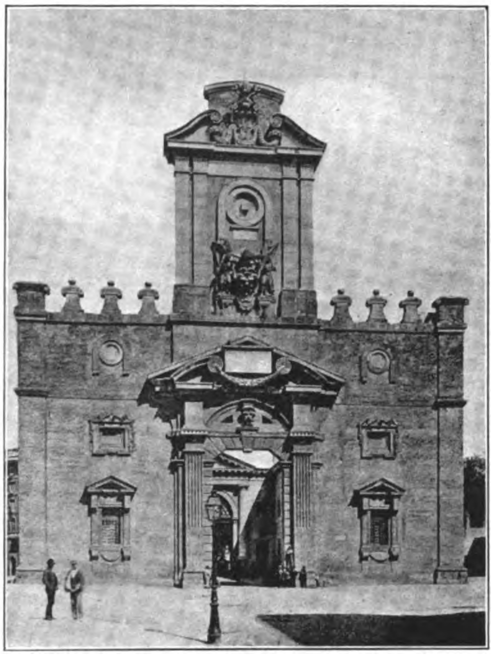
COLLEGIA DELLA SAPIENZO, ROME

Michelangelo was chosen, very near the end of his long life, to design the rearrangement of the top of the Capitoline Hill. He died before much had been accomplished, and as usual the completion rested largely with the graceless Giacomo della Porta, although other architects worked on it up to 1650. The quadrilateral space is approached from the Sacra Via by a long and magnificent flight of steps with trees on both sides, and flanked at the top by two groups of statuary. The place of honor in the middle of the piazza, which is not a square, but narrows considerably toward the steps, is given to the famous antique equestrian statue of Marcus Aurelius; it is placed not quite in the center of the piazza but somewhat toward the Senate House, to prevent its being too prominent from the steps, and to make it the central feature of the group of important buildings at that end of the piazza. The buildings are so arranged as to be plainly visible from the foot of the steps with the Senate House opposite the head of them, a definitely dominating feature. On the left is the Capitoline Museum, reproduced in another building across the square. In them we see that significant feature, the colossal order, used in palace architecture here for the first time. Doubtless it gave rise to countless banal designs during the Baroque, but here it is undeniably beautiful. We can take no interest in the crude, soulless details of Giacomo della Porta, but the general design of the noble Corinthian order, dividing the front into admirably proportioned bays, is very fine indeed. There is a small Corinthian colonnade in the ground floor, and the dark shadows under it, and the play of light and shade in the strongly modeled windows and great overhanging cornice above, give the façade a delightful richness and variety. The Senate House has a very high basement which is invisible from the bottom of the stairs, and concealed from the square itself by the flight of steps leading from both sides up to the central door; from the center of the steps, a colossal fountain projects into the square. What one sees from the bottom of the stairs is the colossal order of Corinthian pilasters over the high basement, with two stories of windows, the lower row large, the upper small, and the central position is further marked by a tower in the center. All the buildings have balustrades over their cornices. This is one of the few examples in existence of the design of city squares as units by Renaissance architects, and it is a pity that Michelangelo did not have the opportunity to do more of it, in view of his success in this instance, and of that mental characteristic which made him so much better able to cope with large designs than with small ones.



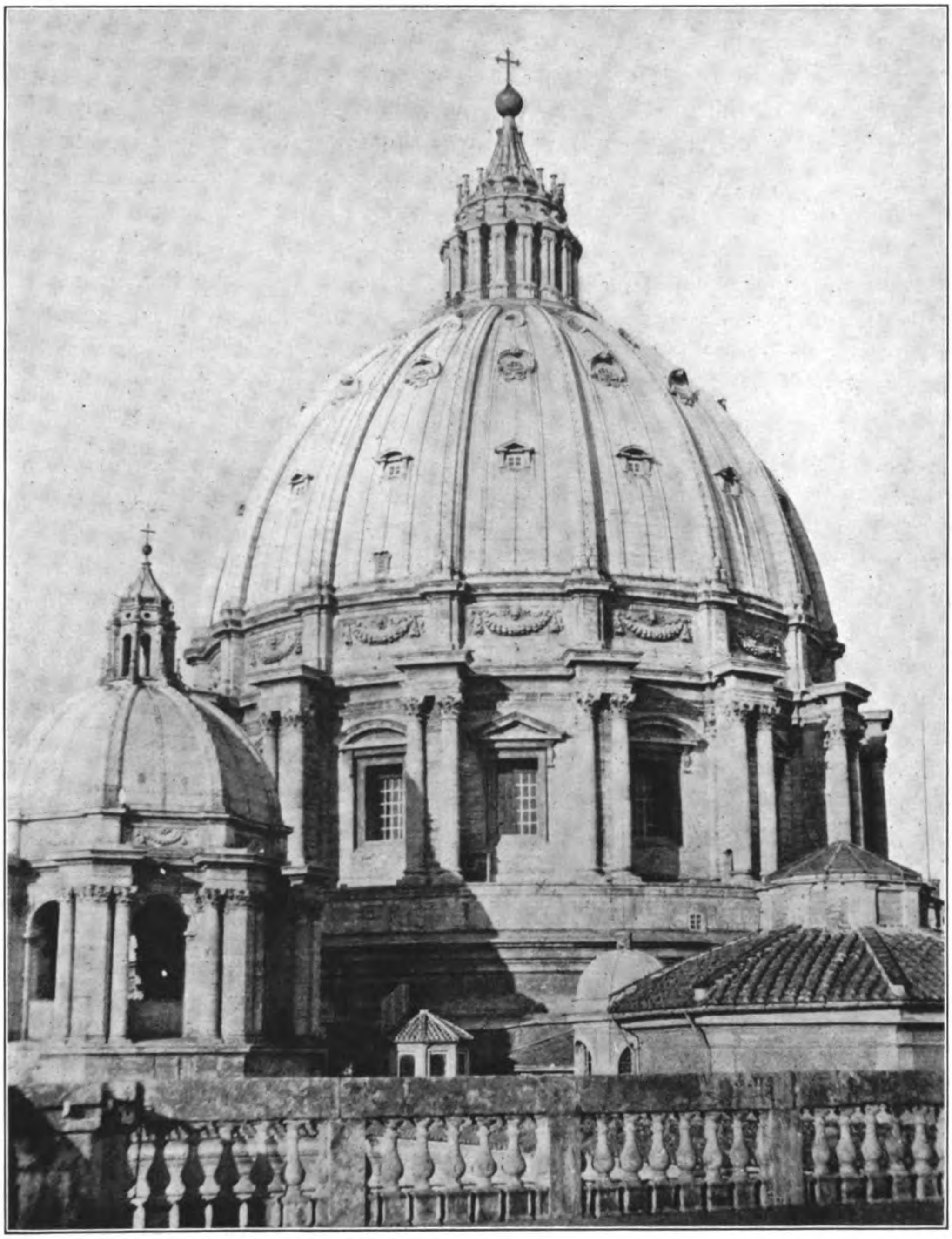
THE APPROACH TO THE PIAZZA DEL CAMPIDOGLIO, CAPITOLINE HILL, ROME

In his very last years Michelangelo designed the Porta Pia, almost, as one might say, as an explosion of wrath and defiance at his enemies the formalists. We fail to find here the carefully decorated wall space, for the great mass of the gate structure is broken by the entrance to the passage, enframed in the usual way and crowned with such a colossal and confused mass of cornices, entablatures, lintels and pediments, interspersed with triglyphs and other incongruous features, as almost to defy analysis; certainly analysis is scarcely worth while, considering the atrocious quality of the design, and would lead to no valuable principle, as none seems to have been in the mind of the designer. The gate is a vigorous protest against an enervating system, and as such, ugly as it is, may yet be of value at present, when it may well serve as a warning and a rebuke to that numerous army who unscrupulously pillage bygone styles in order to make up for their own deficiency in thinking power. One wonders whether Michelangelo can have regarded it as a grim joke. The Baroque architects, far from understanding its protestant meaning, delightedly seized upon its absurdities and reproduced them in their own designs.



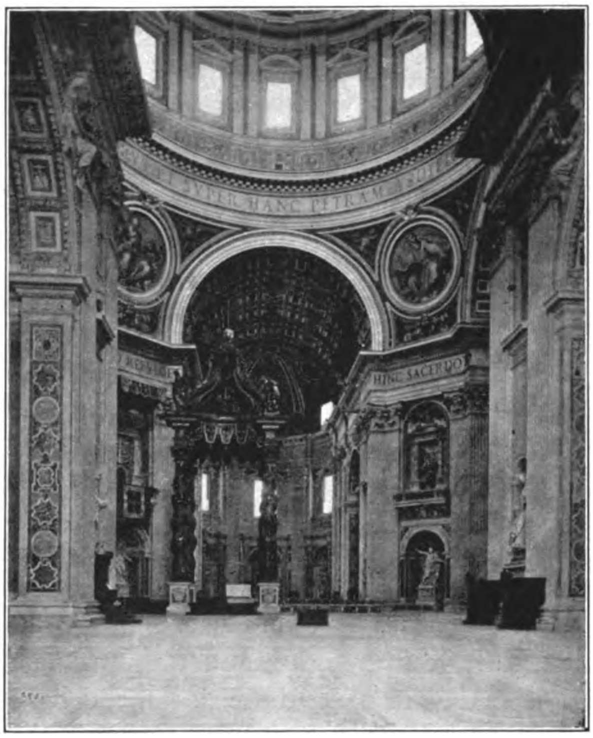
THE PORTA PIA, ROME

I have left the design for St. Peter's till the end because it was not only the largest commission which Michelangelo ever received, but the one which occupied his attention continuously from 1547 till the time of his death, that is to say throughout the last seventeen years of his life. His predecessor, Antonio da San Gallo the younger died in 1546, having accomplished very little actual building, but leaving a complete set of drawings and an elaborate model. He had planned to elongate the nave in the fashion of Carlo Maderna's ultimate addition, but in a very ingenious and interesting way. Michelangelo rejected this scheme absolutely and returned to the plan of his old enemy Bramante, saying that no one could do better than follow that scheme of the Greek cross, which gave the proper dominance to the dome, and allowed of a much more unified design than did the Latin cross plan. He, too, made a complete wooden model. His first actual work, however, was to destroy some inferior construction which had previously been carried out. His integrity was so absolute, that he went at his work of destruction with perfect frankness, knowing that nothing could be satisfactorily accomplished until the foundations were made as good as possible. Indeed so rigorous was he in demanding only good workmanship that a great protest arose about the extent of his changes and their costliness. He was in a position of extraordinary independence, for he was working entirely without remuneration, and was so well known that, though a few might object, he knew that he had the greater part of Italian craftsmen with him; so when he was taken to task by a great cardinal for spending large sums on changes, he haughtily replied that it was for the clergy to provide the funds and see that as little graft as possible occurred, and leave the designing to those who understood it. He had earnestly desired to be excused from this great commission, being seventy-two years of age when it was given to him, and accepted only on the the urgent insistence of the Pope. His first actual construction was the filling up of the stairs which Bramante had left in the great piers of the nave crossing. In plan, he decreased the size of Bramante's Greek cross by omitting the ambulatory around the apse and the transept ends; inside, the entrance to the nave was to be a semicircular feature to balance the apse; the front was to consist of a huge double portico, ten columns in back, four in front; four minor domes filled the corners of the square, and would have given a much needed unity to the exterior, the lack of which is sorely felt now that only two of them are built, and those can be seen in proper relation to the dome only from one point on the Tiber below the Castello Sant' Angelo. At a later date, Maderna added three whole bays to the front of the nave, and a colossal vestibule, which, of course, completely screened the great dome and its two subsidiary domes. Bramante had started the piers for the great dome on foundations of inferior rubble which themselves rested on beds of unequal depth, standing, on one side



THE DOME OF ST. PETERS, ROME

on the ancient circus of Nero, and on the other, on a Renaissance foundation of piles. Uneven settling of these beds has shaken the enormous structure which crushes them down, and the inferior quality of the piers has given cause for apprehension. According to Michelangelo's model there should have been a third shell to the dome inside the two actually built after his death by Giacomo della Porta. Had this been done the added weight would doubtless have weakened the structure still more. The logical method of constructing this dome would have been a series of horizontal rings; the members which really do the supporting are, however, a series of huge vertical ribs like those in the cathedral at Florence. This again shows how little Michelangelo understood the principles of architectural construction, and how thoroughly he understood the means of artistic expression in an abstract way. The dome at Florence had always been a source of delight to him, and its inspiring curves were just what expressed most nobly the religious exaltation for which the great church stood. These ribs he made, then, to be the chief external feature of the dome. They passed through both shells, and at the drum were strengthened by a series of projecting buttresses, the strength of which is much lessened by being pierced with arches to form a passage around the bottom of the drum; moreover, the buttresses are of cut stone and the drum mainly of rubble, a discrepancy which has caused a separation between them, and extensive cracking in the buttresses, resulting in an almost complete vitiating of their function of abutment; from the outside they appear quite adequate, as they are larger outside than they are next to the drum, and have coupled Corinthian columns at the outer edge. The faulty supports and the weight of the gigantic lantern, have caused cracks in all the ribs between the shells; and especially in those piers in which the small stairways run up to the top of the drum, and again in the dome where the stairs are continued up to the lantern between the ribs. Evidently the dome did not appear stable to its designer, for he arranged a series of great iron chains to bind it about the springing point, and later investigations proved their necessity, because all of them had broken with the spreading of the dome, wherefor they were replaced and their number multiplied, until now it is only by their aid that the crumbling structure is maintained. It will be interesting to see, when the dome has become actually unsafe, whether the modern engineer, with his developed skill and greater resources, will be able to rebuild the dome in such a way that it will be self-supporting. Granting that the dome does not fulfil the reasonable demand that any architectural work be self-sustaining, let us look at this great work for what good there may be in it. The immense dome is made to lift itself from the earth by an arrangement of admirable simplicity, designed with unerring skill. It is the most perfect example Michelangelo left of that noble spirituality of which he possessed so much and, in his architecture, so seldom obtained. The peculiarly majestic effect is gained simply by the lines of the dome reinforced by the great ribs which rise on its sides to the lantern, and immeasurably heightened by the marvelously simple and effective placing of the three rows of circular windows running around the dome at intervals decreasing as they approach the lantern. Here we see the sculptor rising to his true level; this design let him draw away from academic composition, where he had always been out of place, and gave him a great theme to expound, in a structure which beyond all other structures, gave free play to the sculptor's feeling for beauty of form and motion. So he made the great pilasters start the movement from the ground, and the curving ribs and huge vault spring from the building to the lantern where was to be a golden angel with his wings outspread. The main features of the interior seem to have been fairly well started before Michelangelo commenced work on the building (*cf.* the drawings of Heemskerk of the partially completed building, given in Geymüller); he was, however, responsible for not foiling the colossal pilaster order with a smaller one. Happily he cannot be blamed for the false and vicious decoration so lavishly applied by Borromini and Bernini to every available space. In Michelangelo's designs for St. Peter's there is a marked lack of that rebellious spirit which I have remarked in all his other designs; doubtless that was due to the increasingly religious trend which he took ~~in~~ his later years and which, in some measure, abstracted him from the distressing conditions of his native city; here it was given free play, and he could work in peace for the glory of God, as he would not do for the gratification of man.



INTERIOR OF ST. PETER'S, ROME

There remain to be spoken of those architectural forms which occur as supports in the painted vaults of the Sistine Chapel. Here, in a medium much more akin to his power than was architectural design, Michelangelo depicted some of the best and most delightful of his architectural thoughts. The great ceiling is cut into at the sides by four lunettes over the windows; between these, the spaces are marked by pedestals with slender balusters at the corners; on these pedestals stand pairs of children on whose upraised hands rest reduced cornices of perfectly clear and simple mouldings; the cornices are broken out over the pedestals to support those famous youths seated in strange and contorted positions, back of whom are the simple archivolts which divide the main part of the ceiling into panels large and small for the principal paintings. In this instance, the architecture is so perfectly subordinated to the real purpose of the decoration as to be quite appropriate and altogether beautiful.

We have seen in Michelangelo's architecture no consistent development, as is ordinarily the case in the work of a great man, as was true, indeed, of his own work in the other arts. We have, however, seen very great differences in quality in his designs. The one qualification which seemed to render architecture tasteful to him was great size. Hence he was successful in designing those few parts of the Palazzo Farnese, and preëminently so, from his point of view, in St. Peter's. Again, he was quite able to design architecture to be used merely as a frame for another art, as in the Tombs of the Medici and in the painted architecture on the ceiling of the Sistine Chapel. He was completely unsuccessful in designing on a small scale, as in the Library vestibule and the Porta Pia. These are the three classes of architectural design which he undertook, and his various success. It is obvious that in monumental structure, in spite of unapproachable spirituality, he lacked that knowledge of engineering and realization of construction necessary to really good work. He offered his designs reluctantly, well knowing what virtues they had, and making no claim to those which they had not. The disintegration of the dome of St. Peter's proves only too well his own often reiterated statement, that he was no architect, but a sculptor.

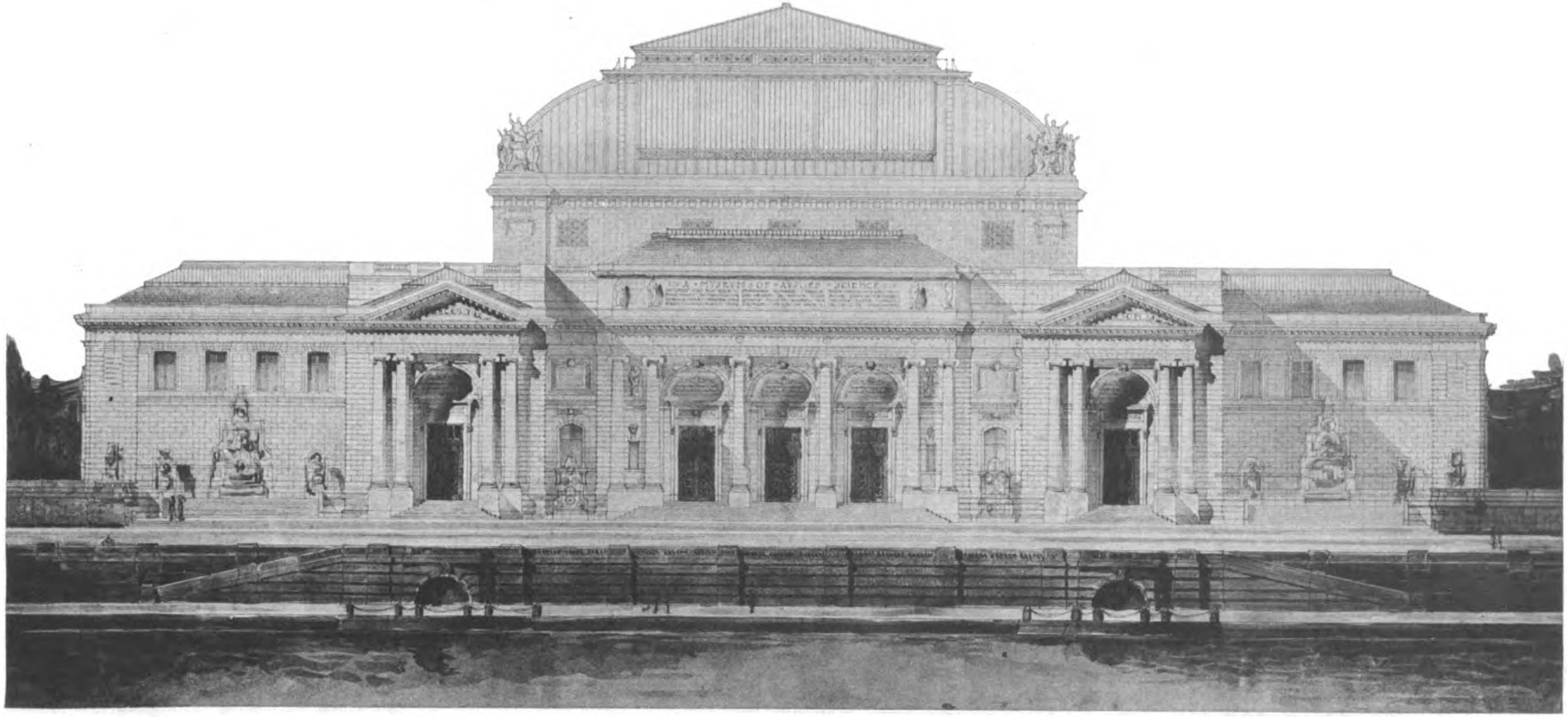
Let us, then, postulate this statement of his, and go a little further into his attitude and opinions. In the famous allegorical figures of Night and Day, of Twilight and Dawn in the Sacristy of San Lorenzo, we see figures in attitudes so contorted as to be all but impossible to the human body—restless and writhing, or heavily dejected and despairing; again, he created those strange human shapes which twist their muscular bodies on the supports of the Sistine vaults. Here he was the absolute master—knowledge such as no other had was at his command and he exhausted its possibilities; in these two examples we see him carrying the same point of view into the two arts of sculpture and painting. He was driven into architecture, and tried the same thing. Always a protestant, every work must express revolt, so he twisted his window frames and his pediments, he let his fancy build great masses where no supports upheld them, he piled lintel on lintel and arch on top of all, and broke linear features with freakish angles and corners. Carried out in the nominal forms of classic architecture, he produced those peculiar window and door heads, and other confused features which excite our wonder; essentially, however, it was the same thing that he did to the human body in carving or painting it, the difference lay only in the unequal knowledge at his command. So we find him leaving the placidity of those early designs for the façade of San Lorenzo, and becoming more extravagant as his feelings deflected him from abstract composition and forced him to his real task of expounding a protest. He ~~could~~ not be a designer alone, but must always be a philosopher and a prophet. The sound principles of order which he so well understood as a sculptor, governed him in designing large buildings, but when he had the chance to design the detail of a structure, he saw that in a large way, too, and so nearly always made it too prominent. In all this extravagant detail, none of which was included in the designs of the conservative architects of the time, we see the incipiency of the forms which came later to characterize the Baroque, we see the restless revolt against the conventionality of the period which was stifling the vigor of the Renaissance; not that Michelangelo's way was the right way to set the arts in the path of health and virility again; it was the social revolutionist rather than the artist-revolutionist that the time demanded, and another Attila or a second Alaric would have been vastly more efficacious than one artist, even though that one be Michelangelo. For the trouble lay primarily with the political organization and the social structure. Freedom was a thing of the past in Italy; the republics had given place to oligarchies and numerous heavy-handed tyrants. Politics and morals were corrupt to the last degree, and worst of all they had become so out of the wrecks of liberty. Tyranny was, then, a growth, and as such, inevitable, and invincible except to the changes of long years of evolution assisted by occasional revolution. The arts naturally reflect the nature of the civilization in which they flourish. When Florence was a republic, with an enlightened and progressive people, the arts, under the encouragement of the government and the church, were at their best. After the people had been enslaved, their artists produced no more great works of art, but toys and trappings as fine as possible for those great nobles and opulent burghers who alone could demand them. The form which this debased art was taking in Italian architecture, was the late classical formalism. Michelangelo, part artist and part prophet, proclaimed its badness, but his unconscious message was stifled by being enthusiastically misunderstood. His followers were children of the times, and used their master's inventions with complete disregard for their protestant significance, and with a total lack of their master's greatness. His unrest, the rebellious protest of his spirit against the debasement of his time affected his artistic expression not always for good; made it even appear as an expression of the very vices against which he rebelled. This discouragement which must have been great and bitter, he seems to have expressed in the lines which he put into the mouth of his statue of Night:

"Grato m'è 'l sonno, e piu l'esser di sasso;
Mentre l'danno e la vergogna dura
Non veder, non sentir m'è gran ventura;
Però non mi destar; deh! parla basso!"

Thus translated by Symonds:

"Sweet is my sleep, but more to be mere stone;
So long as ruin and dishonour reign
To hear naught, to feel naught, is my great gain;
Then wake me not; speak in an undertone!"

In the Sistine Chapel is the great fresco of the Last Judgement which seems so perfectly to embody the attitude of the artist toward his time that I shall close with a consideration of what seems to me to have been in the mind of the artist, and of what it means to the modern architect. We see in this picture no trace of the gentle bearded figure which we, from habit of representation associate with the name of Christ, but a gigantic and beardless youth who hurls into destruction the wicked and the false. And if we look not for a depiction of heaven, but for the bitter prophecy of the aged patriot, we shall scarcely pause with Mr. Ruskin and Mrs. Jameson to lament the proprieties, but will rejoice that we live not, as did Michelangelo, at the end of a period of freedom, but at the dawning of a new one. In his picture, the wicked being driven into punishment are those people and those institutions which had contributed to the enslavement of Italy, and which he well knew must be destroyed utterly before better things could grow into their places. So it is not the Last Judgement, but the allegory of social Death and Transfiguration.



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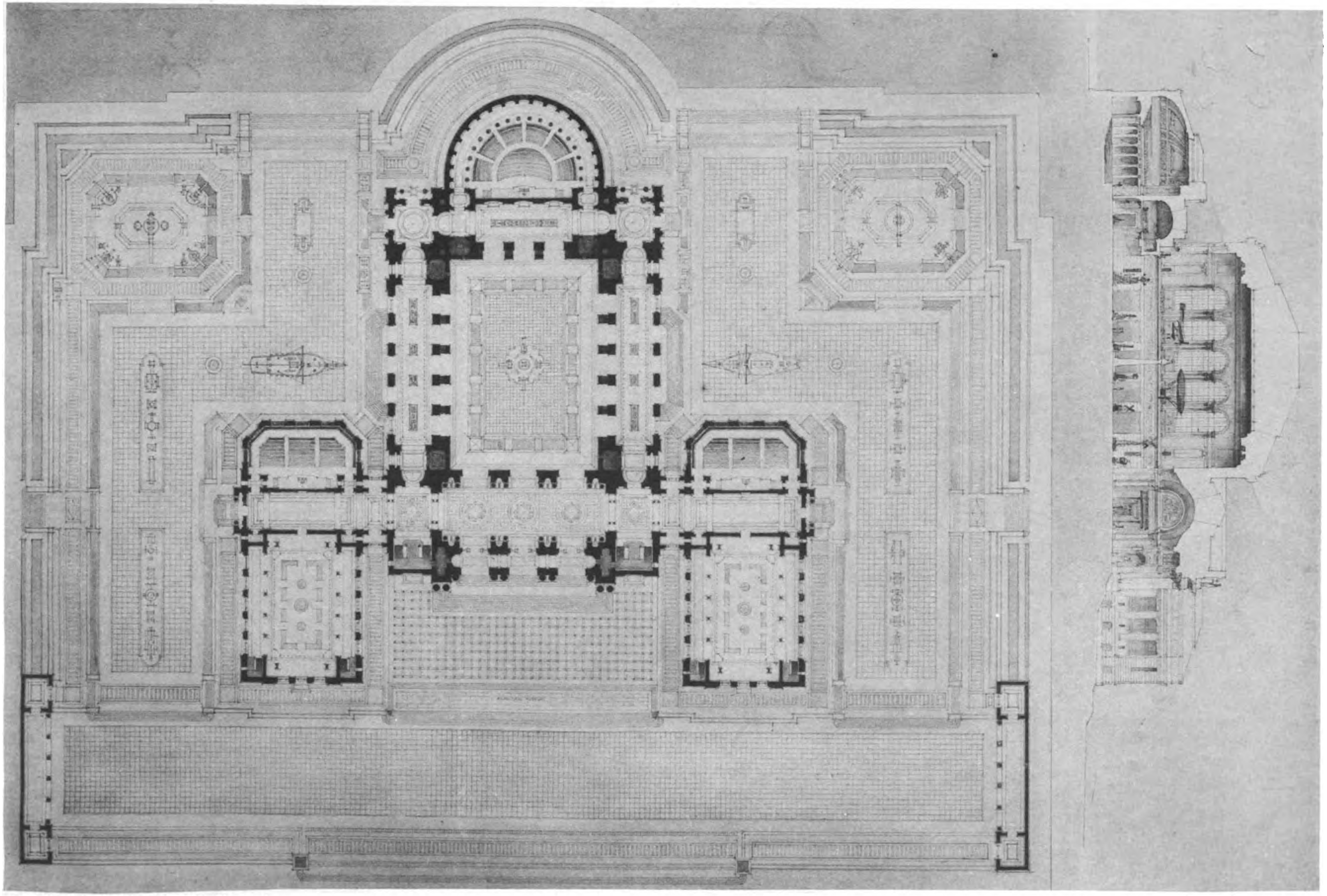

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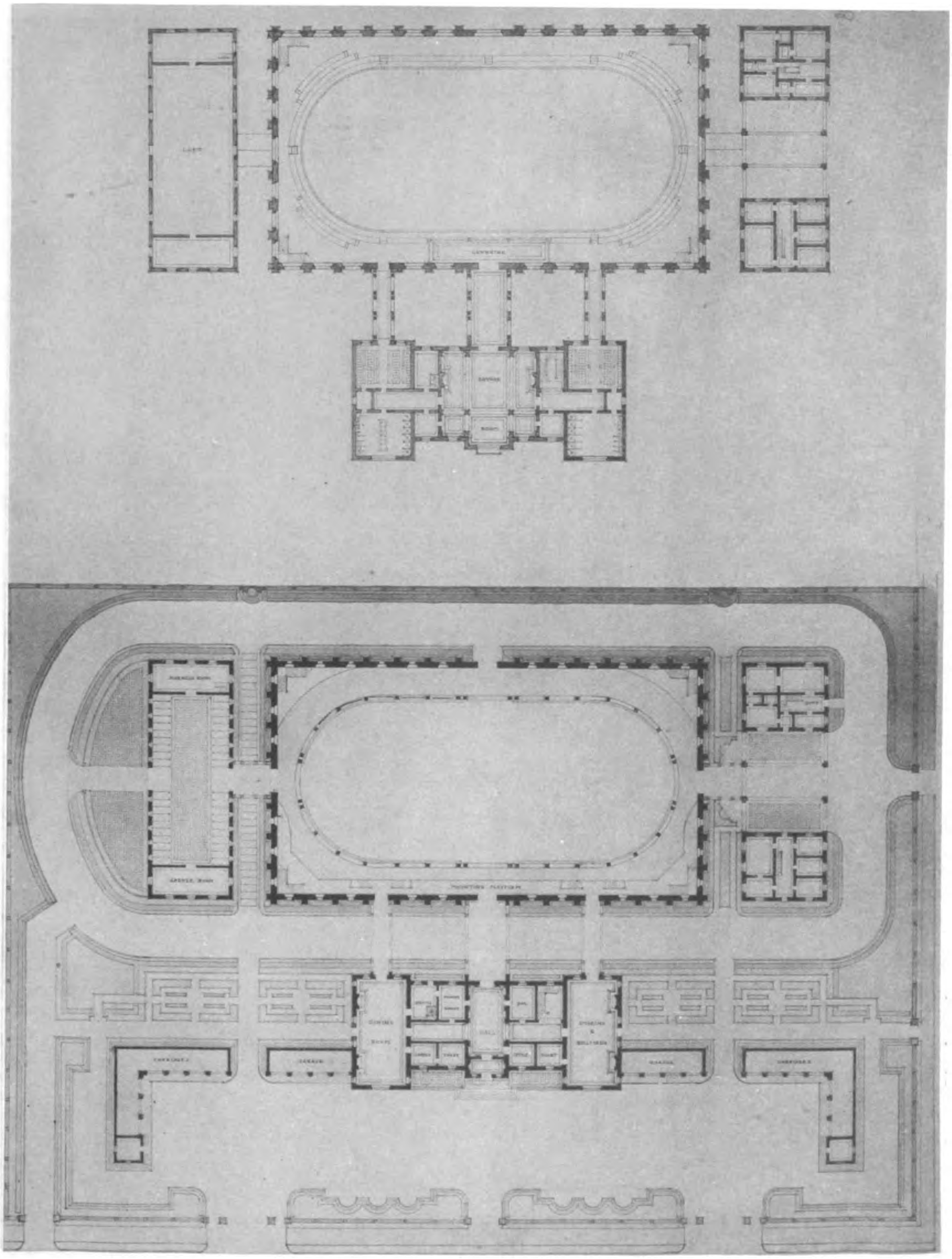

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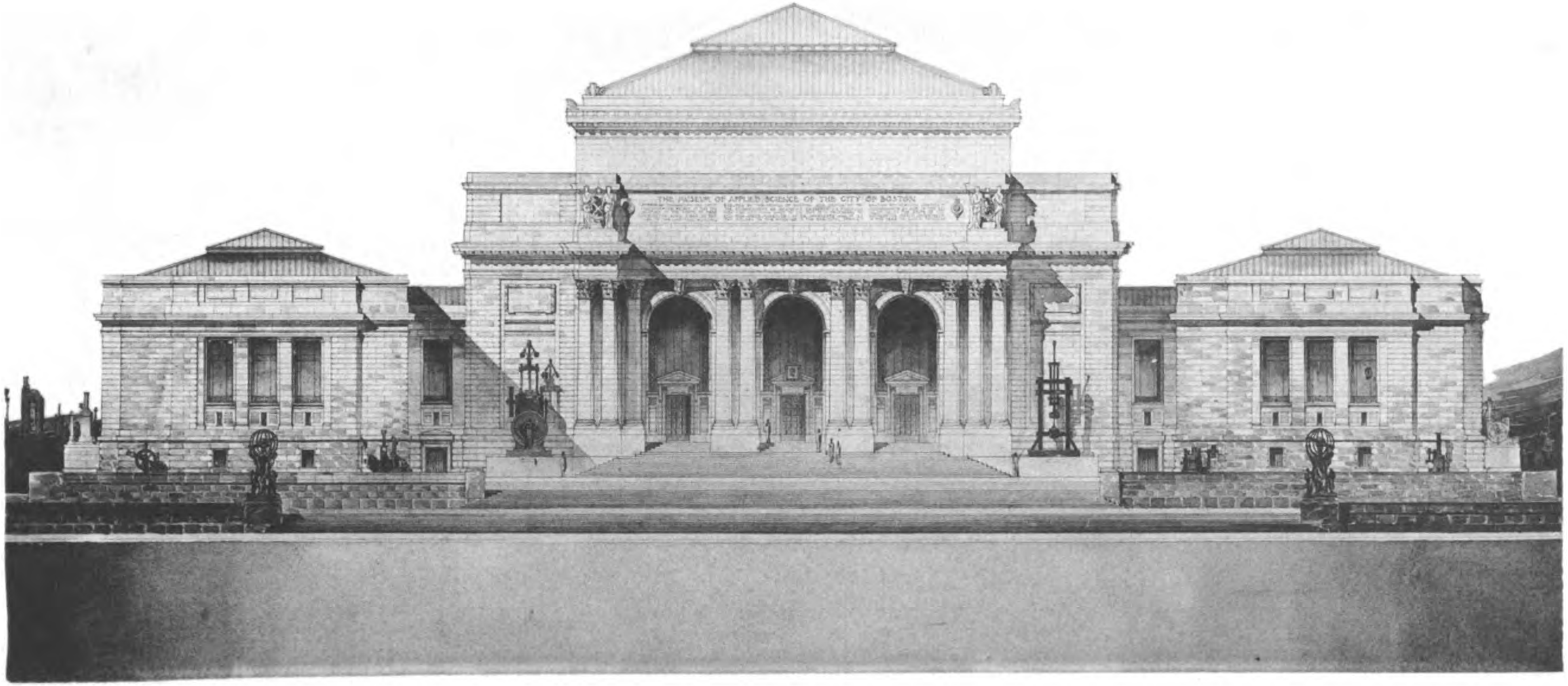

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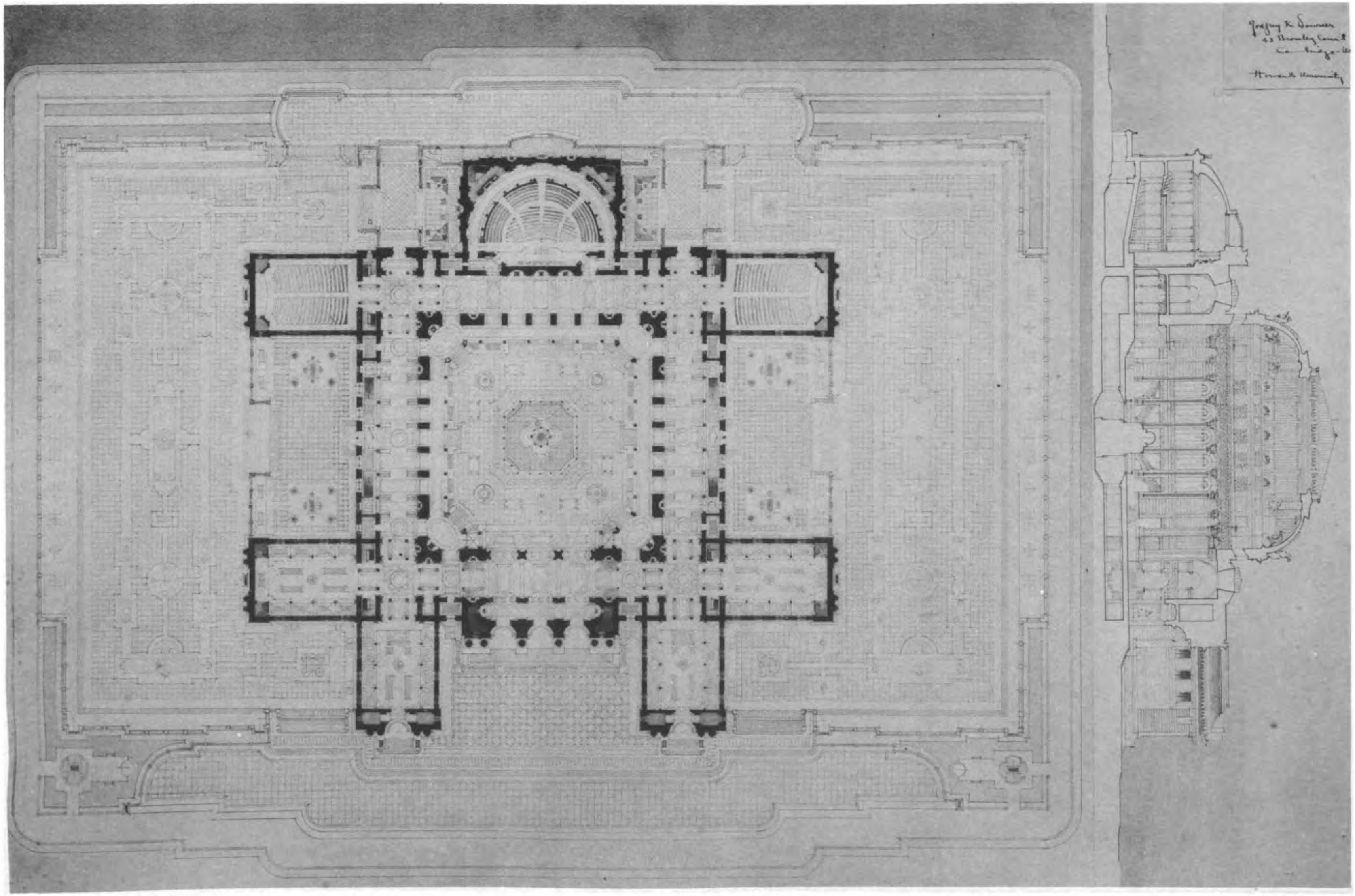

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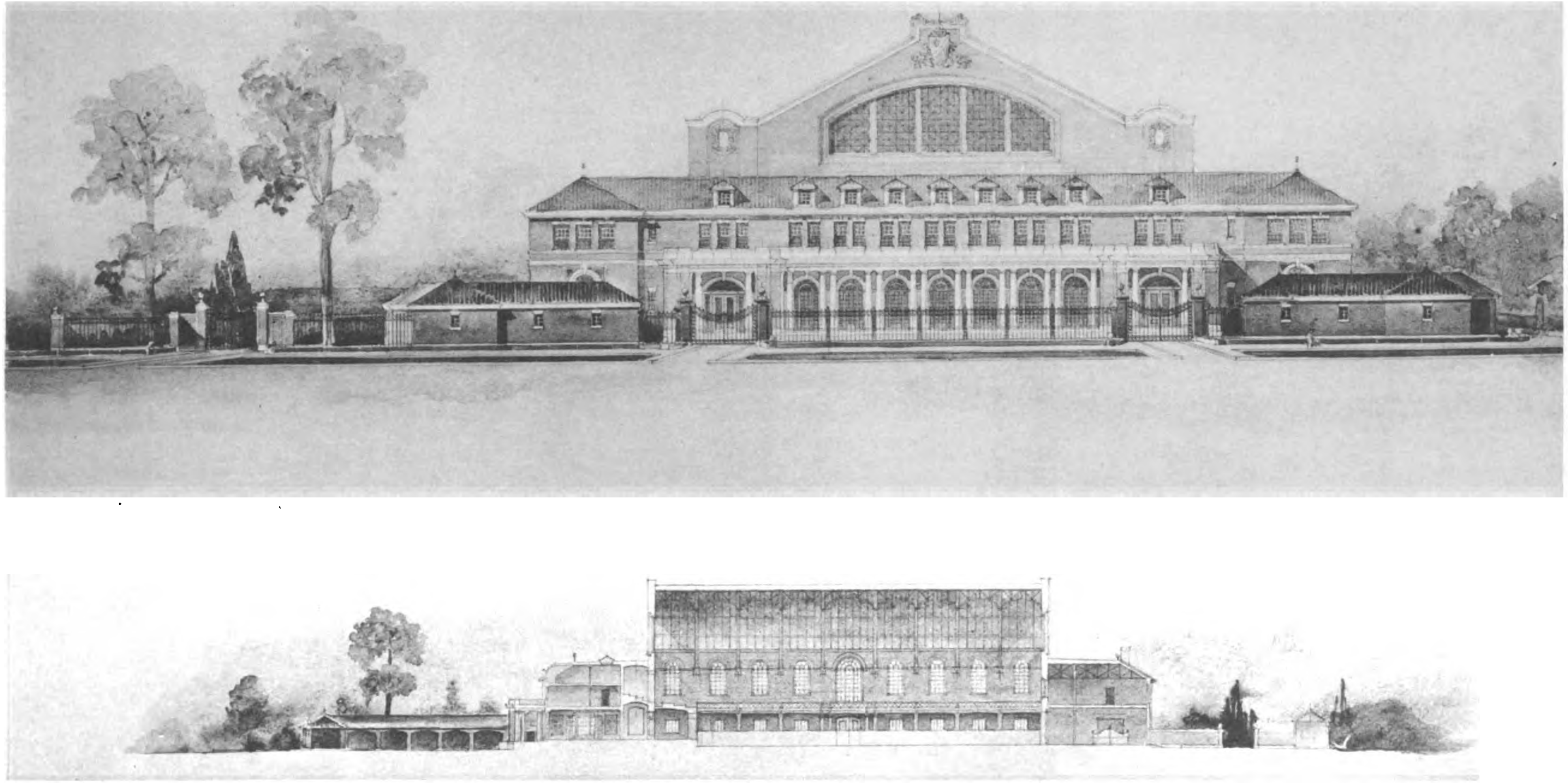

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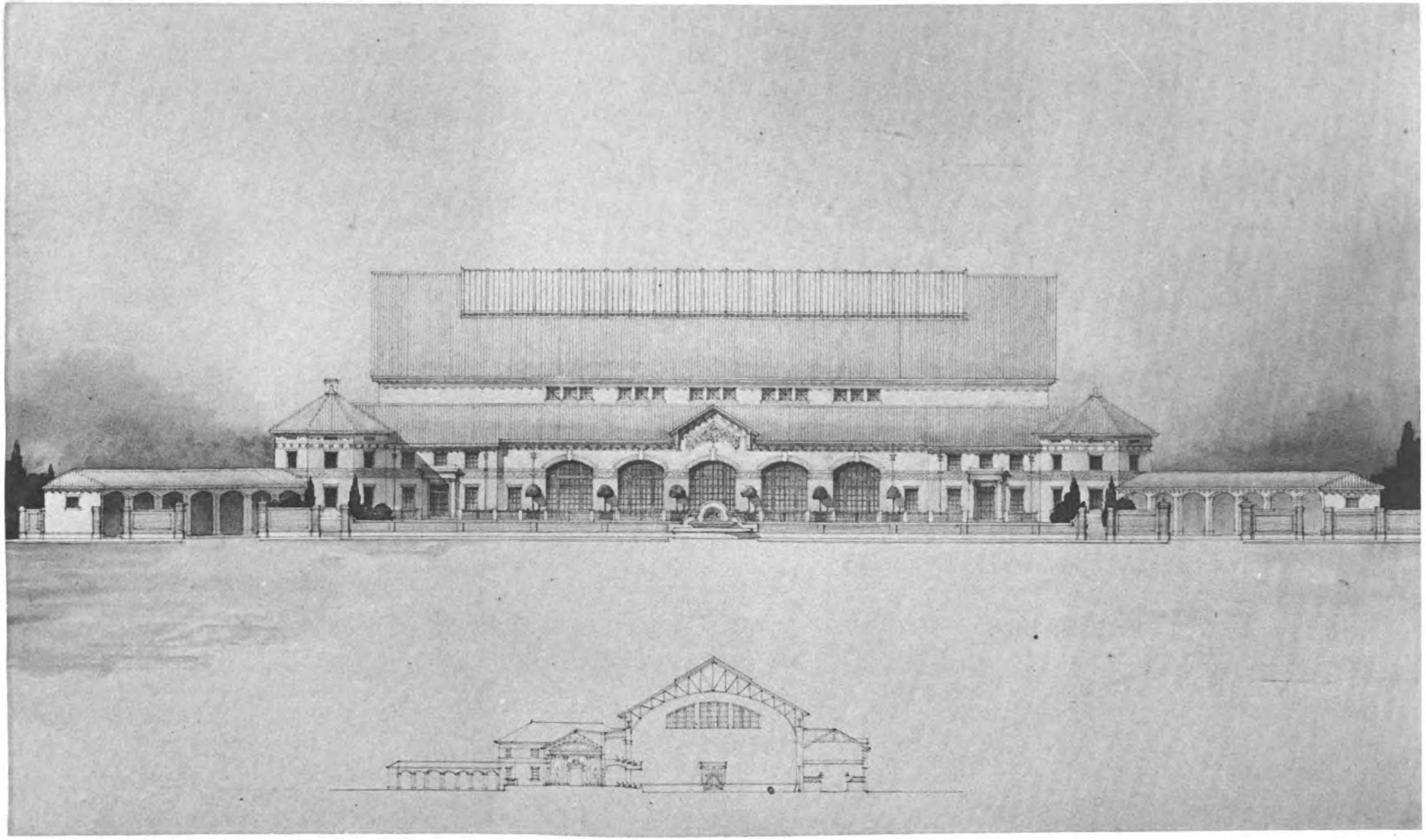

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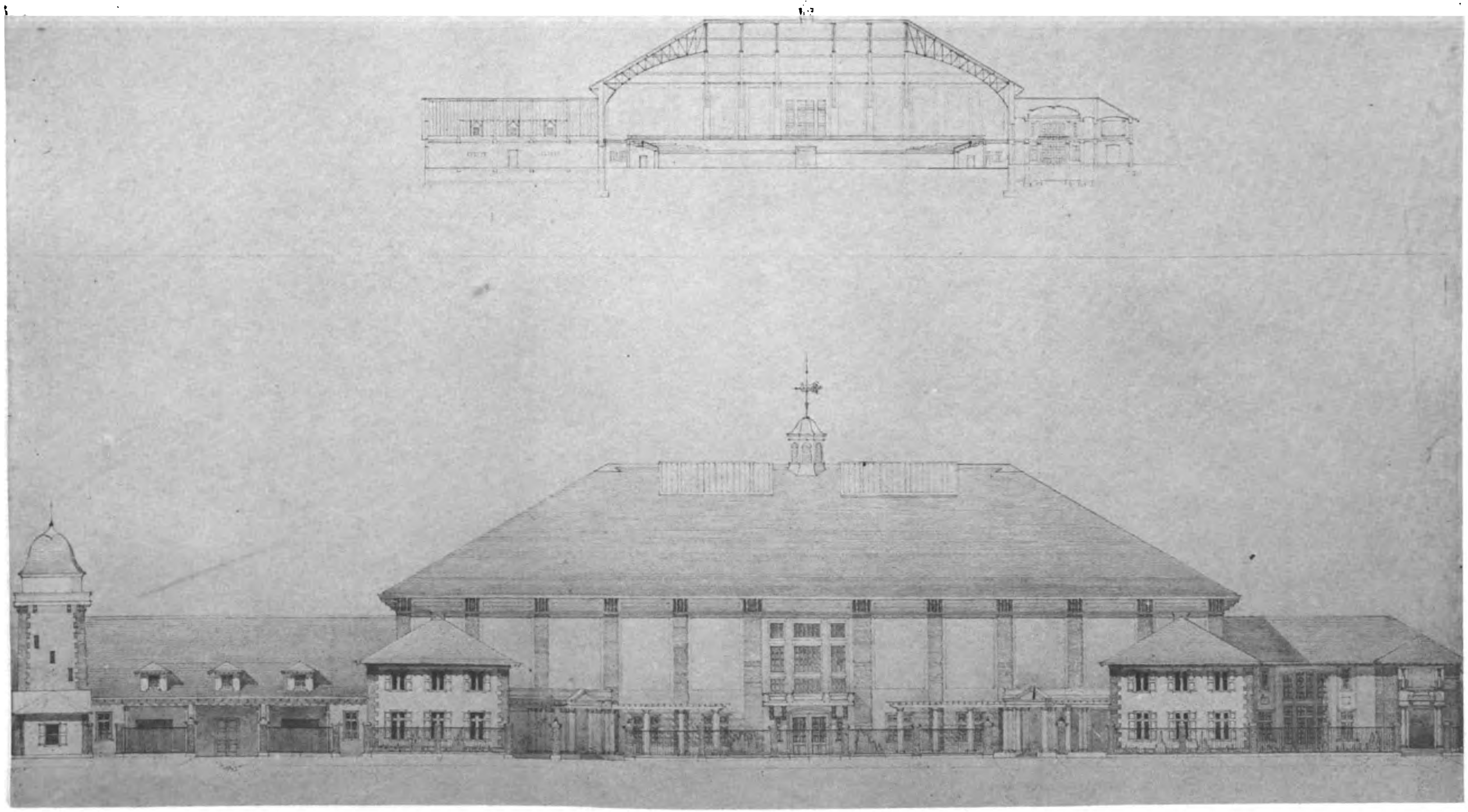

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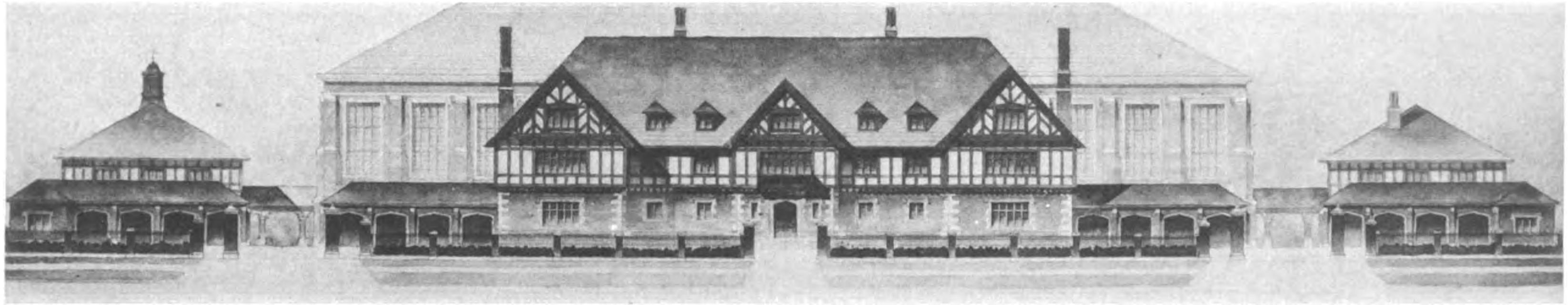

A RIDING CLUB AND SCHOOL IN THE COUNTRY

ELEVATION AND SECTION

W. N. MASON 2ND CLASS

Supplement to the
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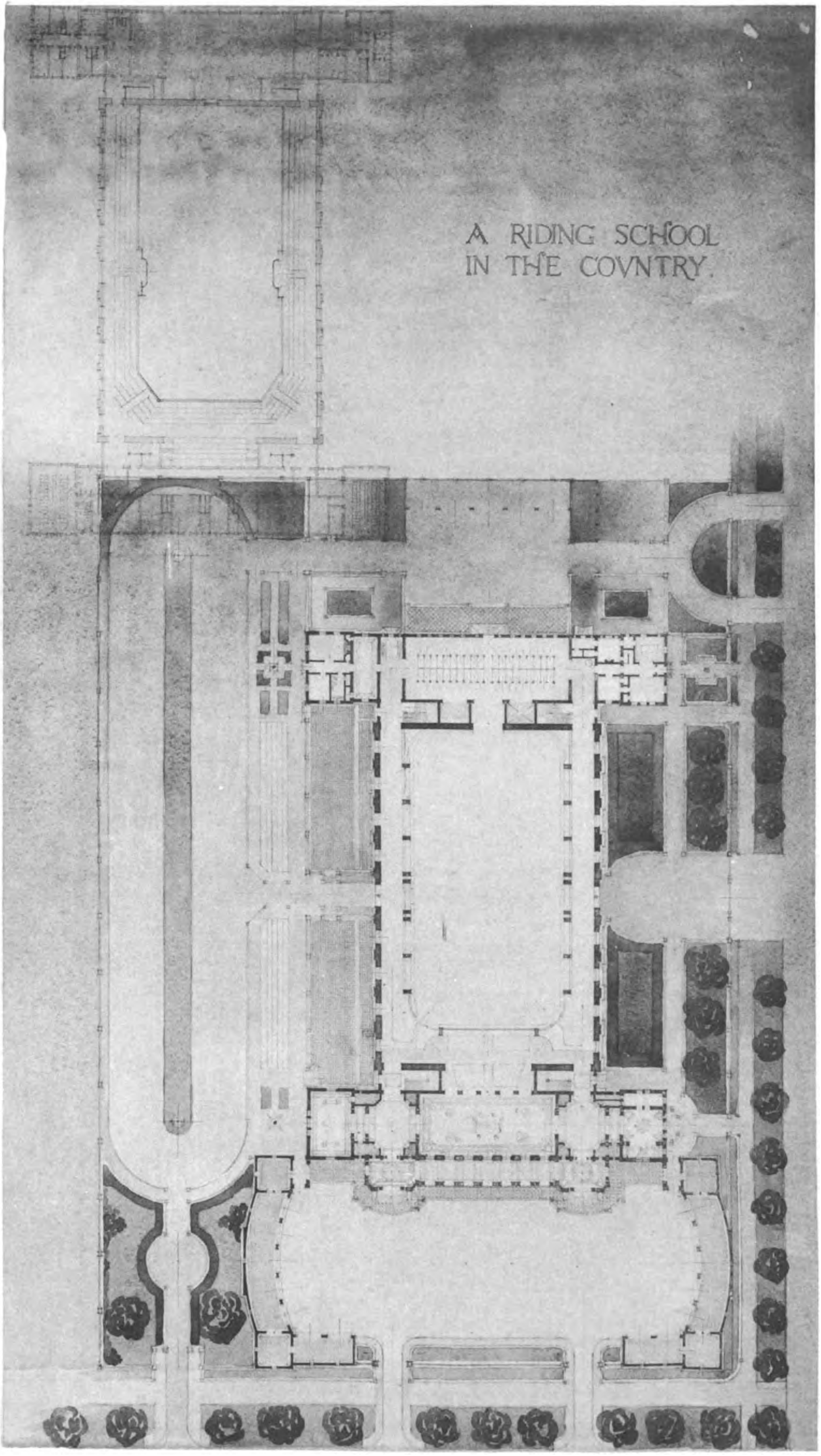

A RIDING CLUB AND SCHOOL IN THE COUNTRY

PLAN 1ST AND 2ND FLOOR

MENTION IN INTERSCHOLASTIC COMPETITION 2ND CLASS

W. D. BARTON SCHOOL OF ARCHITECTURE, HARVARD UNIVERSITY

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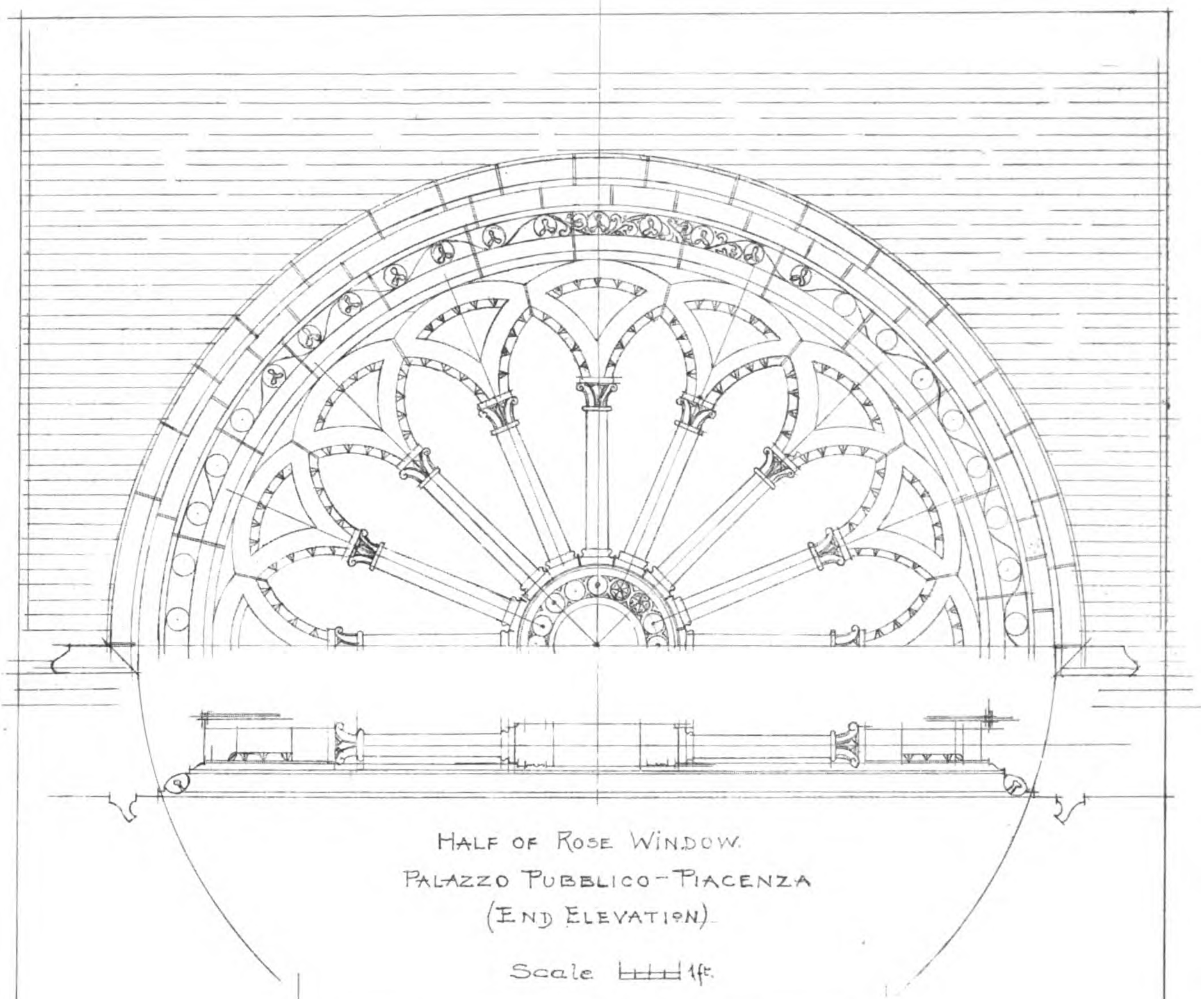
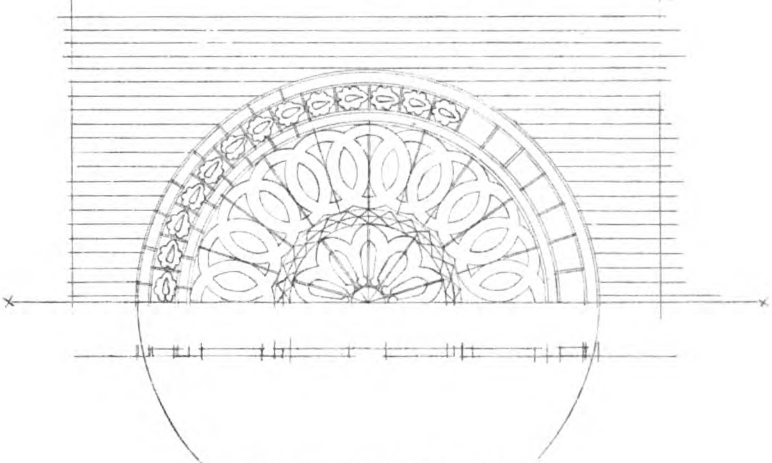
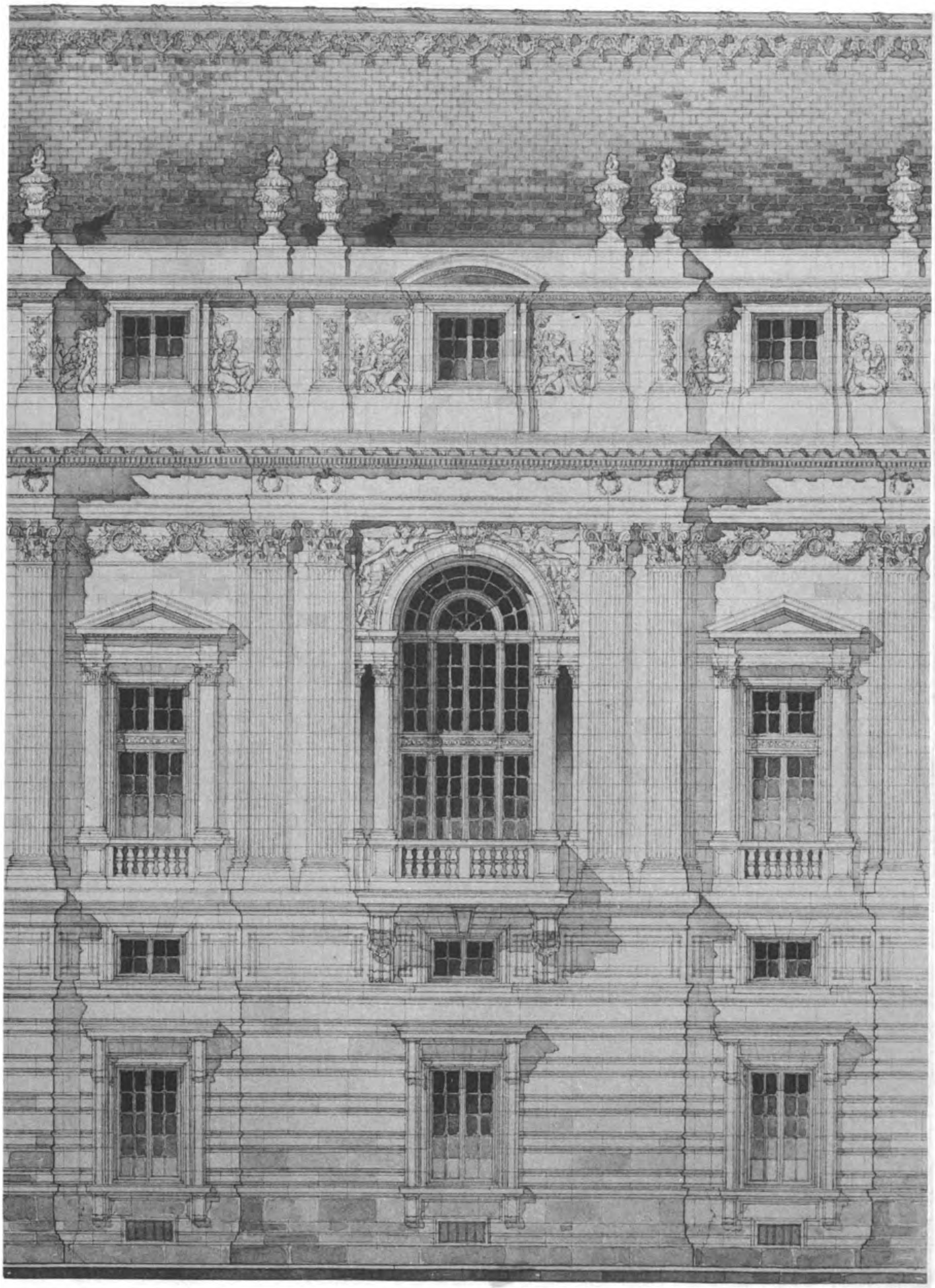


HALF OF ROSE WINDOW.
PALAZZO PUBBLICO – PIACENZA
(END ELEVATION)

Scale 1ft.



BRICK DECORATION
CORTILE



A PORTION OF THE WING OF A GOVERNORS RESIDENCE

DETAIL STUDY OF FACADE

HOWARD MOISE ADVANCED DESIGN

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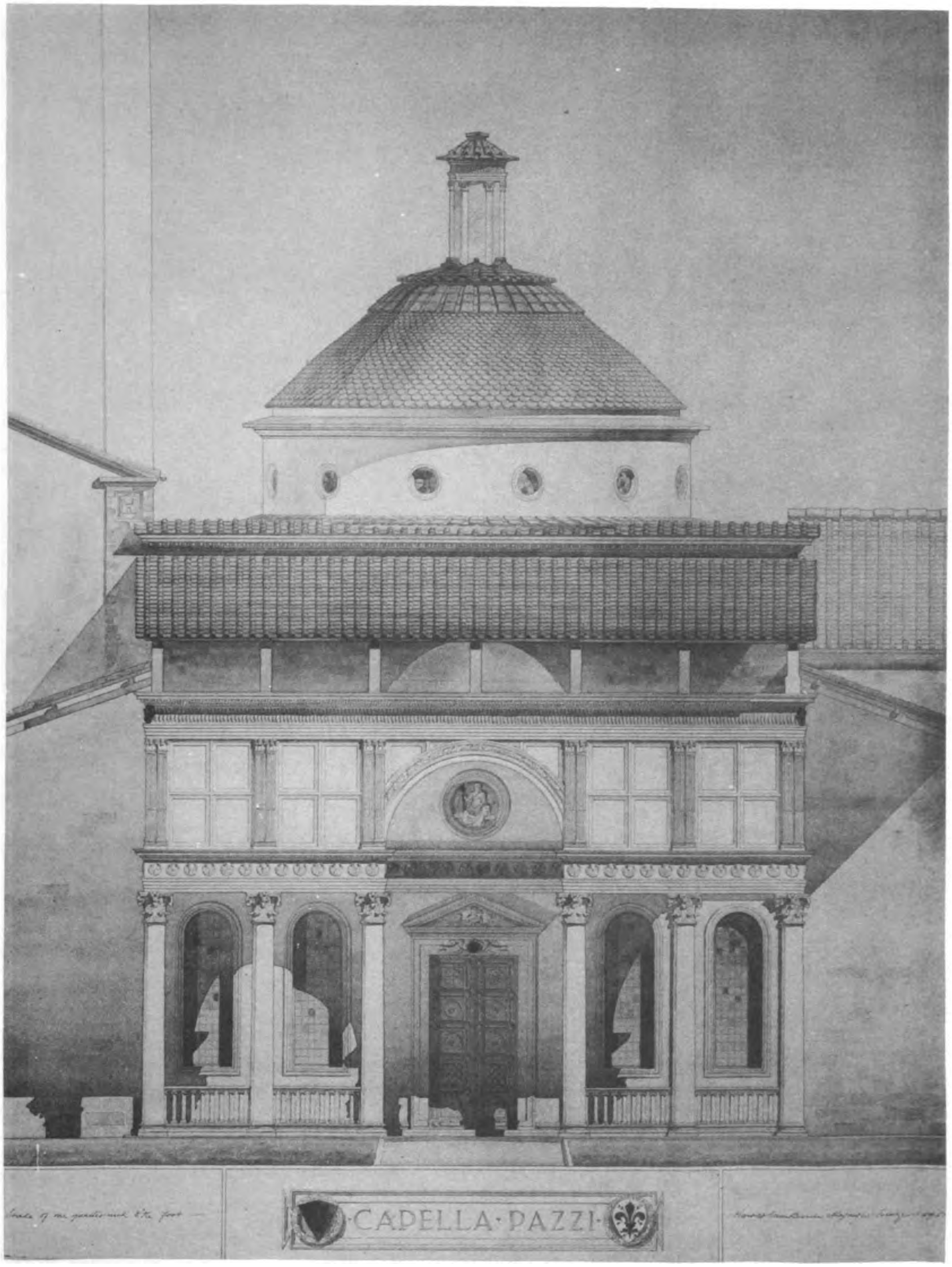
June 1912



CAPELLA PAZZI, FLORENCE

MEASURED AND DRAWN BY H. VAN BUREN MAGONIGLE

ENVOI OF THE ROTCH TRAVELLING SCHOLARSHIP

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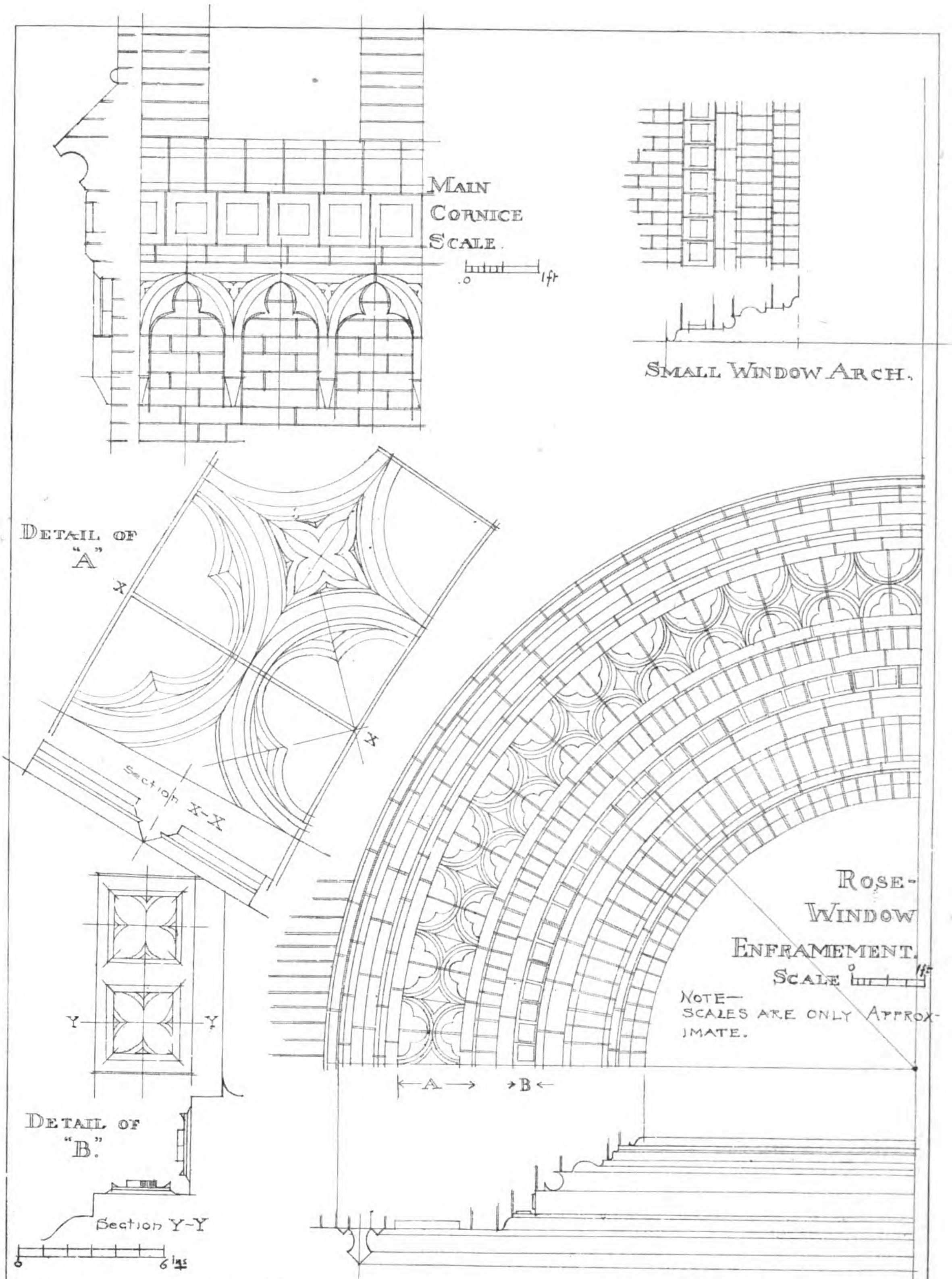

Note— Scales are only approximate.

Details of St. Agostino, now incorporated into the Town Hall, Brescia.

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Volume I September 1912 Number 3

The Teaching of Architecture E. J. A. Duquesne
Notes for Three Lectures on Municipal Improvements R. S. Peabody

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THE ARCHITECTURAL QUARTERLY
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THE TEACHING OF ARCHITECTURE

E. J. A. DUQUESNE
PROFESSOR OF ARCHITECTURAL DESIGN IN HARVARD UNIVERSITY

HAVING had, like some of my masters and former colleagues, who like myself were pensioners of the Academy of France in Rome, the honor and responsibility of being called quite early in my career to teach architecture in Paris, I have already been able to test by practical experience in teaching the long meditations and the various studies incident to my sojourn of five years in Rome, in the midst of that atmosphere so filled with historical associations, and so rich in great masterpieces of art. I have been able also to take advantage of the observations gathered during the many journeys made during my period of residence at the Academy, in other parts of Italy, in Sicily, Greece, Algeria and Tunis, in Germany and Austria, and finally in my own country, France, which I confess not to have really known and studied until that time. I thus had brought to my notice the greater part, at least, of the evolution and progress through the ages of this work of architecture in which all civilizations have cooperated, and which continues to obey the eternal law of change and transformation. At the same time I came to be more and more impressed with this idea: that a fine work of art has never been created without purpose—that the saying "art for art's sake" has no foundation in reason, least of all in architecture which, as its name implies, is the art of good building.

To teach architecture is to teach that which may be well constructed, or, to put it otherwise, to teach the designing of buildings which will bear critical analysis and examination. I do not lose sight of the fact that with modern processes it is possible to construct almost anything, even the most illogical forms, and by means of various ingenious devices to give them the appearance of stability; but this has nothing to do with art, and is but the production of veritable artistic lies. For this reason, in saying that the various forms in architecture should be derived from ideas of construction, I mean that good design in architecture implies the combining, adjusting, and arranging of forms which shall be essentially characteristic of their real structure.

Buildings, then, are the aim and end of architecture, and although in an architectural school one does not actually build, everything that is designed there should be capable of being constructed. One creates or one chooses, first of all, certain combinations, one arranges their proportions, then science is called in to verify the stability of a part or the whole. Architecture is thus at the same time a fine art and a science, a fine art by invention, combination and foresight; a science by analysis and the rigor of verification. Consequently art without science is insufficient, just as science without art is sterile. The teacher of architectural subjects, then, must be guided by considerations of this double aim—of the needs and requirements to be fulfilled, and of their actual realization. This is his whole recipe; but simple as it seems, it assumes on his part real understanding of construction and proficiency acquired by practice in the treatment of a variety of subjects, maintained by a series of personal productions, and by study of methods and principles, the general exposition of which find natural place in a professional curriculum. Finally, it assumes constant contact with the pupils in the draughting room—a workroom not at all to be regarded as a class room, but rather as a real laboratory of research in which the continuous efforts of the student should be centered. This will be spoken of further on when taking up the subject of the study of architectural composition, but before considering that subject it will be necessary to make clear to the student the conditions under which he can with advantage attack the study of architecture, and to help him to realize from the start, if possible, to some extent that which will be demanded of him later in order worthily to practise his profession. For nowadays problems and conditions, always more or less complex, demand that an architect should be a serious and well-educated man, having taste, artistic feeling and imagination, and at the same time, knowledge, sound judgment and fertility of resource. He should be, then, a many-sided man; as Guadet says "a man of science in all that concerns construction and its application, a man of science still, in his profound knowledge of all the patrimony of the architect, and finally an artist in all the superiority of an art which concentrates, dominates and associates the other arts." He must realize that he only can be an architect in the full meaning of the term who is both an artist and a man of science.

If we consider now the condition in which the student should find himself who wishes to take up the study of architecture, I would say that—beside natural aptitude—taste, ardor, and much enthusiasm are necessary. The student should be possessed also of a foundation of general knowledge—first, literary, which will open his mind and teach him to think; then scientific, which will accustom him to logical and exact reasoning; finally, artistic, for of course he will have cultivated his taste and his natural tendencies by drawing and possibly by modeling, which is still but drawing. In scientific matters it would be necessary for him to know arithmetic, algebra and geometry; then, if he can, trigonometry and part of analytical geometry, for he should be as much mathematician as possible in the beginning. With this he should have some general ideas of chemistry and the fundamental laws of physics. But of all such studies he should know best descriptive geometry, for in architectural drawing, plans, sections and elevations are but direct applications of this science. As to freehand drawing, there is only one thing to say—that is that the beginner never knows how to draw well enough. These briefly are the studies which one should have had before commencing the study of architecture. They are neither too many nor too few, and the student possessed of a college degree as well as natural aptitude, and who has had the good fortune to have devoted himself to drawing, will fulfill these conditions.

LET us consider now the student registered in the School of Architecture, full of eagerness to attack the studies which I would call preparatory to architecture. He must proceed methodically and remember that to progress rapidly and surely to the study of architectural composition, it is indispensable that in the beginning he should know thoroughly the elements of architecture and also the elements of architectural composition, studies which will necessarily absorb much of the first two years of his course.

The first year the student will be initiated into the general and invariable principles of art, principles the same in all the great artistic epochs, notwithstanding the most profound differences in the forms of expression. He will understand and remember these by means of exercises and reviews, which will form part of the course in the general history of art and architecture, understanding always that one cannot be taught architecture without being shown historical evolutions. In teaching this subject one should be on one's guard against certain abuses, for although a historical course ought to be explanatory of certain manners of conceiving forms in certain epochs, it should in no way become a circle in which the whole study of architecture is enclosed. To take full advantage of this study of history, one should at the same time know the materials and the elements of architecture. In this way the study of history will tend to establish good taste on a sound basis, and will, as Guadet says "show the apogees concording with the discipline of accepted principles, the decadences fatally expiating the disintegration of these principles, and the epochs of renaissance lighting up their reawakening." It is precisely by the abuse of historic study in certain countries that some architectural productions have been entirely borrowed from archæology. But after having imagined utilitarian Parthenons, as in Munich, or reproduced old friends, such as the Procuratie, the Massimi Palace and the Farnese Palace, one may be sure that designers will come back, even as in France they have already come back, to consider that our modern customs in no wise oblige the architect to borrow his forms either from antiquity or from the middle ages, or from the Renaissance, in order to translate and satisfy needs which have become entirely different from those which characterized these epochs.

If I insist a little on these considerations, it is not for the sake of sweeping away all that has gone before us, for since we have made mistakes (and we shall certainly make more) we must be on guard against throwing the first stone. The value to beginners of a study of the subjects that lie within the scope of a course of architectural history will be found chiefly in seeking in the past all that has become classic, that is to say, all that has emerged victorious from every analysis and has been canonized, so to speak, and by comparing these beautiful examples with copies or deficient adaptations of them, so as to make clear the essential differences. In this way the student may be led step by step to an appreciation of fundamental principles, to the end that perhaps he in his turn may be able in the future to attach his name to some logical and beautiful work that may be worthy of being included in the catalogue of classics.

During the time that the student is being impressed with the beauty of these classics, he will be making the acquaintance of what we will call the "arsenal of architecture," the elements; that is to say he will learn what a wall is, what windows and piers are, what columns are, what vaults, ceilings, stairs, etc., all are; he will learn why these elements never cease to vary according to their importance, their placing, their function, their material, and their surroundings. Parallel to this work he should develop his skill in drawing, for it is in this part of his work (it cannot be repeated too often) that he can never progress too far. First it will be in geometrical drawing that he will have excercises by means of analytical and reconstructive drawings studied from documents and measurements, *relevés* as we call them, of architectural fragments corresponding in the beginning as much as possible to his studies of the elements mentioned above. Incidentally these drawings should not be of the kind made for exhibition or to add to a collection, but should be serious analytical studies. They should be always undertaken in the draughting room, and the student should first consider the plan, then the various sections and finally the elevations, first seen from the front, then from the side, and even in oblique projection, in order to familiarize himself as much as possible with the projections and recesses which make up the third dimension, which beginners, and even those not beginners, so frequently ignore. These *relevés* should be made complete by a perspective sketch, and if they can be repeated from memory, they will become a valuable aid in discerning the reason of each form and at the same time its essential characteristics. These drawings are in the beginning sometimes executed on squared or co-ordinate paper to facilitate measurements, but I would suggest using only simple white paper in order to avoid being accustomed to any help whatever.

At the same time that the practice in geometrical drawing by means of the *relevés* just spoken of is taking place, the student should be cultivating his artistic knowledge by the assiduous practice of freehand drawing from a model in relief: drawing from ornamental forms in the beginning, followed by drawing from a living model, ***but never from other drawings or even photographs*** when it is a question of studying drawing. For, I repeat, drawing is a work of intelligence above everything else; it is the intimate and profound understanding of the essence of the model itself. It is the difficult art of perception, the means of grasping the feeling in a shape and of translating it, and one does not translate by means of translations already made. Let us instruct ourselves from the model itself, and let us choose preferably a recognized and classic model, that our taste also may be educated by its beauty. It should be clean and sharp and its modelling neither effaced nor worn, and when being drawn, should have a direct and not diffused lighting, if necessary from an artifical source.

In regard to drawing it is the greatest error to imagine that this is an exercise of the hand. Real drawing is an exercise of the eye and at the same time a conscientious analysis of the object drawn, and it is not sufficient to mechanically copy an object, to reproduce photographically a model in order to have something; one must also have understood and felt it, to explain it properly. "To draw" (quoting Guadet again) "is to follow closely a form, a contour; it is to fix relations without other help than the study of proportions; it is also a means of cultivating good taste, and by long practice makes one more sure of fertility of imagination and artistic richness," and all this without the aid of compass, measure, or even plumb line, but with the eye alone. I insist on this as the only and unique instrument of measure and proportional evaluation.

Drawing, then, as we see, should always be serious. For this it is necessary to devote oneself with method and not to hurry. It is necessary to learn how to comprehend the model in order that in the end the character and the different relations may be grasped and understood, for it is not until after this is done that one begins to fix the forms and progressively to model them, if it is by relief that the principle features of the model are expressed.

As to processes to be employed, that is a secondary matter: whether with hatching or with stump is of little importance, but I believe one should not complicate matters for the pleasure of realizing a tour-de-force, for the greatest pleasure that one can desire is to be able to establish the identity of the model with the drawing once it is finished.

During this time the student can also try some watercolors from nature, which will always be practice in drawing, but for the beginning I would strongly suggest that this should not be done until the study of the fragment which will have served as a subject of the *relevê* has been finished. Some of the beautiful coloring given by age to certain materials may be very valuable for the student to note, and there again he will both exercise the eye and cultivate the taste. Finally he should do some modeling, which is but drawing with clay, and he will learn then even more of surfaces than by simply drawing, and will gain definite ideas on the respective value of reliefs and hollows. For as ordinary drawing reproduces the appearance of objects, modeling offers this superiority in the fact that it reproduces the objects themselves and teaches him to see still more. One can say without contradiction that modeling prepares us the more directly for the feeling of architecture.

So much for the artistic preparation. At the same time the student should have completed his scientific equipment, and applied himself to the diagrams of descriptive geometry, from which perspective, shades and shadows and stereotomy are directly derived, after which he will attack the study of construction properly speaking, which will occupy two years in a course in which will be presented to him on the one hand practical means of calculating such and such a section of a wall and beam, or a point of support, as well as arches and vaults, and on the other hand the composition of different materials, the methods of use, and their diverse applications. This study of construction will be in a certain way the application of all the scientific studies which the student has had, and one can say that it stands in relation to algebra and mechanics, as architectural composition stands in relation to the elements of architecture, that is to say one can with advantage undertake one only after thoroughly knowing the others.

THE further study of construction will include practice on particular examples and a deeper study of some special cases in which the student will find means of applying the knowledge which he has been assiduously acquiring. Then also will reappear the study of architecture itself, for the student must now begin to use the elements which he has already learned, but of course he will not yet commence the study of architectural composition, properly speaking. For this it will be necessary for him to know the elements of composition, that is to say, he should know different rooms, different porticoes, vestibules, also bays of exterior façades in contrast with the interior of the same bay, as well as isolated pavilions or pavilions attached to an edifice, etc., etc.; all this by a study of fine examples, which he should thoroughly absorb in order to familiarize himself with the reasons which in their origin led to their being conceived in this way rather than that. When the moment comes to compose architecturally, it is necessary that the student should be rich enough in his knowledge and judgment to be able to call up the analogy of the finest examples, that he should be able to say to himself, as Guadet explains it "here are rooms that I should like to study in the character of the salons of Versailles, or the halls in the Palace of Westminster, or perhaps in the Palace of Fontainebleau. This stairway could be analogous to that of Caserta, or that of the Palais Royal. This vestibule and this court might be inspired by arrangements similar to some of those in the palaces of Genoa, and so on." One could multiply examples to show what the elements of composition are.

The student should continue in the good habit of making concurrently with his studies in the draughting room more *relevés* and sketches. He will be drawing from the collections in the museums and from originals, or reproductions cast from parts of buildings. Parallel to this he will be drawing in the life class, and modelling, and becoming more and more master of the means of expression in representing the exterior as well as the interior of subjects which he will be called upon to compose in his final years.

It is at this period that the student will apply himself to the most fascinating part of his studies, to that part which includes design in its entirety, and to which reasonably he should be able to give several years. Nevertheless it is certain that if he knows properly and has methodically arranged and followed his preparatory studies in the way that has just been indicated, he must in even one year of advanced work in design at least have learned those principles which are capable of guiding him when in the future practice of his profession he will become his own counsellor. In the first place, he will have learned to analyze his programme properly, which, in parenthesis, is not always easy, since frequently that which is really important occupies but little space in the description in a programme, whereas the enumeration of secondary requirements necessitates by their multiplicity a greater number of lines, which often confuses and troubles even a trained student. Again, he will have learned to consider the conditions of the site, which are always given. In one case it might be a plot of land isolated on all sides and flat. In another there might be access to it from only one or two sides. Sometimes it might be on a steep, sometimes on a gentle slope. Or again it might be a mountainous and picturesque site. All this evidently has its importance, so much so, that one can say absolutely that a certain composition imagined for a flat site would in no wise be appropriate for a site of the same dimensions but on a pronounced slope. The climate also in which the supposed buildings will be erected will play its part, for that which is proper for a temperate climate does not correspond to the needs of a tropical climate. In one case the openings should be large and spacious on account of the lack of intensity of daylight; whereas in the other the openings might be made half the size in view of the abundance of light and the heat of the sun, sometimes so excessive that one must guard against it. Finally will be added to these considerations, which necessarily in all programmes have their importance, that which concerns the execution of the work. Even though the subject studied be only hypothetical, its development, once the sketch is studied, should always be carried on with the idea that the conception be always susceptible of realization, which means, that the use of such and such material should also lead the student to arrange his forms as a consequence. One can easily see that all these considerations have their importance, but on the other hand, in order to leave the imagination of the students free, the programme, no matter what it is, although precise in its essentials, should sum up simply and in a few words, that which is really indispensable. One can judge from this that very often it is necessary to read between the lines, and that always, one will be wrong in hurrying to make a sketch without having reflected at length on the programme and having entered thoroughly into its spirit.

In its proper place, after the analyzing of the programme and the working out of the sketch, will begin the studying and investigation of the subject about which in the beginning the student may be more or less informed. Then will come periods of indecision, preoccupation relative to some part that was perhaps neglected in the sketch, which the first criticism of the teacher has made apparent. It is here that the good spirit of comradeship between master and pupil shows itself, and it appears that in reality the master is but a more experienced student, who sets straight and guides his younger friends and who studies with them. Those who have lived the life in the ateliers of the Ecole des Beaux-Arts in Paris will always remember the master—"patron" as he is called—with whom sometimes in discussing a point one went so far as to contest his advice, and who always good-humoredly and willingly corrected the study with a few decisive lines, making his idea clear and exact, proving to the pupil that without changing the scheme shown in the sketch, which would have been unfair, it was still possible to repair its faults and weak places, or at least make them of less consequence.

From his first entrance to the draughting room the student will be able to put himself into the spirit of comradeship which holds sway there, and in many ways will be able to appreciate how much value there is in the exchange of services between newcomers, juniors, and veterans. Later he will understand the reason for the respect which all without exception share before the instructors. It will be only in the final year that he will really appreciate the great advantage of these studies carried on together, and the constant collaboration of master and pupil which, although keeping his individuality and respecting the idea which in the beginning was for him to develop, allows him to express his idea in a way entirely different from that of his neighbor who, nevertheless, with a similar point of departure would have been able to arrive at the same result.

In all this you can see the purposeful liberality of the master to which he attaches the greatest importance. For with consideration for the individuality of the student which he may already have shown, and intending always to respect it, the master tries above all to show the pupil that he need not be a votary at any shrine or slave to any doctrine, that truth alone is beautiful, for him who knows how to seek and find it.

In undertaking to teach that which is accepted as incontestable, that is to say, that which has become classic, he has never encircled the student in narrow limits outside of which there is no safety; quite the contrary. In showing to him all that which is incontestable he will not have forgotten to show him also that which is questionable. For even in the epochs from which he draws masterpieces, side by side with these last, there are not lacking examples of error. This proves also that he should not proscribe a certain style to the profit of some other, for the truth is found in all periods, and the classic also, in all countries and all schools. S. Sophia, Notre Dame, the Palace of the Doges, and the Louvre are classics, as well as the Parthenon and the ancient Baths and Amphitheaters.

After having taken up various problems of some importance in his final year (it is unnecessary that they should be very large for the influence of size is negligible in its results) after having also of course given proof of his progress and ability, and consequently having obtained the mentions and values required by the rules of the school, the student will apply himself to preparing his thesis for the diploma, complying with the usage for obtaining the degree, the consummation of all his studies. The candidate, after having arranged his programme, for the choice of subject is always his, by preference the development of a building of not too great importance (private house, industrial establishment, small theater, preparatory school, etc.) will devote to it from four to six months' work. He will eventually present to the jury charged with examining the thesis-drawings a complete and conscientious study of this building, considered and presented as if the candidate were about actually to realize its construction, that is to say with a number of plans from the foundations to the roof, and also with a number of sections and elevations at a scale large enough to make clear the whole arrangement. A certain number of detailed drawings of masonry, steel and wooden construction, floors, cabinet work and iron work, as well as the diagrams and calculations of stability, showing that the candidate has complete knowledge of the subject, will also be included. A written description will be presented describing his thesis, showing reasons why he has adopted such and such methods and materials in preference to others. At the completion of this work, to show that the candidate is actually the author of the work presented, he will be called upon to defend and complete his work before the jury by oral explanations given in response to questions asked of him.

In conclusion to all that which has just been shown, I would say, that in a country where everything is extreme, in surroundings where even nature constantly presents violent transformations and oppositions, it is by very much accentuated contrasts and by particularly striking examples that the teaching of architecture (one might say of all the fine arts) should be conducted, for all the delicate distinctions, the subtleties which are characteristic of our older Europe will only complicate matters, and uselessly embarass a student in his first efforts. In an environment where everything is done with rapidity, on a continent where cities are born, develop and expand in less than a century, it would be almost out of place to ask him to dream. One must then before all, interest the student, fix his imagination by the characteristics of nature and at the same time develop his sensibility and his judgment without dwelling too long on details, which nevertheless will be broadly presented to him in their place and in the order which has been indicated. In this way a reasonable time will be reserved to students to permit them to consider the greatest possible number of subjects. Besides this, if they have understood the real purpose of the draughting room, they will think of it as a laboratory in which all sorts of expedients and solutions for the right treatment of architectural problems will be analyzed and sought. They will be constantly working there and will understand that they, as beginners, have their part in the analytical studies of the intermediate students, and also in the efforts and researches of those more advanced. They should never in any case take the attitude that outside of their required personal work there is no interest. This would be a very grave error, indeed. For even if it is not required by rule, their constant presence in the draughting room gives them valuable opportunities which will initiate them into their work of tomorrow, permitting them to see and to study certain programmes which perhaps may not be taken up again for three or four years, but which, added to those they have personally worked on, will familiarize them with an imposing number of subjects. Besides, regular presence in the draughting room brings about between the newcomers and the older students a constant exchange of services which is a pledge of a good and frank comradeship that may become the basis of very solid friendships. These are some of the benefits of this mutual teaching which one can never recommend or encourage too strongly.

The general programme of studies will be found to be regulated at Harvard in a manner which allows the students to give all of their afternoons to the work of the draughting room, as all that part which consist of lectures, conferences, recitations and examinations will take place in the morning. Also in each division, intermediate and advanced, the competitions will be alternated in order not to create among all the students at the same time the feverish tension which always appears in the last hours of a competition. Each problem is the occasion of one or more visits to some actual building, which by its nature is as near as possible to the subject given out. These visits facilitate investigations, which, after the preliminary sketch is finished, allow the students to complete the requirements of the programme, at the same time that it will perhaps offer them the opportunity of hearing authorized opinions from competent persons who may be directors or chiefs of administration, long familiar with their particular subject. After each competition an exhibition of the work is held, and then a judgment and a general criticism of the ideas presented is given by the professor. In this criticism he presents the general conclusions that he has reached, and the result of his personal observations on the problem that has been studied. Towards the middle of each one of these problems a sketch of twelve hours' duration gives each student a chance to show what he may have learned in his analytical and research work. In the intermediate class the subjects of these sketches are generally chosen with a view of preparing the student for the competitions of the advanced class, that is to say, the requirements have a certain importance even though the scale at which they are presented is small. In the advanced class, on the contrary, the study and development of a fragment at a large scale accustom the student, who is already trained in *ensembles*, to a research of form and detail, at the same time that he will be developing his power of expression.

In another part of the work of the intermediate class one of the competitions is especially arranged with the idea of its being a general test of construction. The programme for this is given by the professor who has special charge of the construction courses. In the advanced class two of the problems regularly given each year will become the basis of more developed studies presented in the form of supplementary details, as a means of showing knowledge of construction which the student has applied. In the same manner there will also be arranged in the intermediate class two short problems which will test the student's knowledge of historic architectural forms, whereas in the advanced class one of the problems will show the knowledge which the student has in this subject. During this time in each class, besides the regular courses in freehand drawing and modeling, there will be arranged special tests in these subjects, which every student will have to pass satisfactorily. Exhibitions of sketches and watercolors from nature done by the students, will from time to give each student opportunity to show his powers of expression.

The School is administered by the constant collaboration of all the instructors without exception, which permits them to follow attentively the effects of the methods which form the subject of this article, methods which long have been fully justified by the brilliant results obtained by the Ecole des Beaux-Arts in Paris.

Once armed with his diploma the young architect will be able, if he is in a great hurry, to fly with his own wings, that is to say to try his hand at his profession. The equipment he has acquired will in part furnish him with the means of doing this. Nevertheless I should not forget to call to his attention the fact that it is customary for the beginner in practise to make his first efforts in the office of an established architect, where he will learn that which the school cannot teach him; that is he will begin to get real experience by constant contact with work being actually executed and also by the constant relations between architect and contractor, and architect and client, which will initiate him into habits of order and business, habits of the highest importance, constituting as they do the administrative part of an architect's office. At the same time he will have every chance to enter the architectural courses of some professional club, or the advanced course which he should certainly find at the university in the city where he will be working. He will find there during the evenings opportunity of perfecting his knowledge, taking up the study of architectural compositions of great importance—large theaters, big hospitals, universities, etc., and if he is ambitious and desirous of beginning the higher studies, he will find also the possibility of training himself perhaps for the competition for the Paris Prize (which if he should obtain it, would give him direct access to the first class in architecture of the Ecole des Beaux-Arts in Paris), or the Rotch Traveling Scholarship, or the scholarship to the American Academy in Rome, and the fellowships offered by his own university, which would procure for him the great advantage of a stay of perhaps several years in Europe, principally in Italy and Greece, where he would be able to apply himself to the most fruitful of studies, by means of which he would confirm all that he has been taught, adding to this the result of his personal observations.

Thus equipped with general education and judgment, on coming back to the United States with his mind broadened and his imagination fertile, he will again come into contact with realities, and no doubt business will come to him, perhaps by way of personal relations with people, or perhaps by way of public competitions, and will furnish him the means of broadly applying ideas which have grown in him and which will all be based on this principle: that every form in architecture should be, above all, the expression of a need. It is by this that we should prove that architecture is really the art of good building. It is towards this horizon that the young architect who is enthusiastic for his profession should direct himself. The school at Harvard will furnish him with all the means, but he should understand in advance, that a school can only teach those who can teach themselves; and can give students an amount of knowledge very limited compared to that which they can acquire for themselves. It is then by continuous attention, by perpetual and conscientious efforts that he will get the most from his work. If teaching gave everything, all industrious pupils would be equal, but they should understand what Guadet has said so well: "If there are natural talents which are a source of happiness, there are also and above all acquired talents which are a recompense, and every one as an artist will be that which he deserves to be."

NOTES FOR THREE LECTURES ON MUNICIPAL IMPROVEMENTS

DELIVERED BEFORE THE SCHOOL OF ARCHITECTURE
OF HARVARD UNIVERSITY IN APRIL 1912

R. S. PEABODY

LECTURER ON ARCHITECTURAL DESIGN, 1911–12

I.

WITH free opportunity it would seem but rational for any community to prepare for tomorrow as well as today; to remember future generations; to practise foresight; and where could a nation's intelligence be exerted to greater profit than in moulding its cities? That combination and coordination and cooperation which make a city, also make it a model for town and village in most lines of material and intellectual advance. All this moreover is retroactive for "people are in a large way what the city makes them." How important then is a good and beautiful arrangement for a city. "It pays not only in the current coin of commerce but in the refinement, the cheerfulness, the happiness, the outlook on life of the poorest citizen."

But as a rule a city is not planned. Most cities just grow. Broadway, the most important street in the plan of the most important city in America certainly was never planned. Originally a country road extending at Wall Street beyond the city fortifications its natural course would have been, one would have said, into the Bowery and the Boston Road. Some accident turned it northwards instead, and now, not only is it a serviceable and convenient street, but this accident creates the greatest element of picturesqueness in the stupid and mechanical plan of New York City. Where it intersects the regular network of streets there is a constant succession of effective sites. One of these sites is occupied by the Herald Building and one by the Times Building and there are many others from Union Square to Columbus Circle. All this happened without intention; but now comes Mr. Marshall with a carefully studied plan for a crescent shaped street making a much needed thoroughfare between the New York Central and Pennsylvania railroad stations, avoiding the great buildings, creating great values, and adding sites of great beauty to that portion of the city. Here then is one case of accident and one of design. The latter if carried out would give equally good results with the former fortuitous combination. Many towns and villages show unexpected results which are, like Broadway, fortunate; but they can not be confidently counted upon. They should be considered rather as examples to rival when new work is to be done.

There are undoubtedly many happy accidents and sometimes their accidental character gives them a special charm, but we can not be uniformly lucky.

Many a town started on the open prairie does offer opportunity for a scientific town plan, but these inviting chances are lost because of the scant resources at hand, because of the ignorance of the promoters, or from a desire to make a quick turn of capital. Hence we find so many of them laid out in uniform rectangles that stupidly disregard valleys or summits or natural contours. But at times real chances for town and city planning do occur. When Washington, with L'Enfant's help, planned and founded the city of Washington in unoccupied country, or when in our day the country capital of Baguio is created by a paternal United States government spending Filipino taxes wisely, real opportunities again occurred. Even today the rivalry of Melbourne and Sidney is bringing into the Australian world a new city seventy miles from the sea. It is to be equipped with a Parliament House and public buildings, a theater, a university, an art gallery and a library.

But a residential and governmental city like these makes possible an undivided attention to beauty and stateliness. It differs from the ordinary city where men gather primarily for trade and manufacturing and for business intercourse, and where residence merely follows this trade, and it is plain that the world very seldom offers opportunity for a new plan of a great city where trade creates riches and riches luxury. But though entirely new cities are rare, yet renewed cities are far from rare. New quarters, new boulevards on the sites of fortifications or created by ruthless cutting through ancient blocks, all these may and in fact do offer live questions daily. Most new work must arise from chance occasions. Often a town may be improved. It is but seldom that opportunity comes to a community or an individual to plan a town. Hence the town planner must with us generally be an opportunist ready to act when the chance offers.

The World's Fair at Chicago awakened the American public if not to general civic improvement at least to a lively interest in effective monumental architecture. Already many Americans had traveled widely and many recognized the beauty of individual buildings; but at Chicago our whole people saw and many of them saw for the first time how splendid could be the effects gained by the intelligent grouping of noble architecture. The Chicago exhibition was followed by those at Buffalo and St. Louis and Norfolk. Now an interest in monumental architecture has seized the whole country until towns and cities on all sides are talking city plan and civic center. In Philadelphia last year was held the National Conference on City Planning. There was a vast exhibition of designs. You could count sixty American and forty foreign plans for thoroughgoing city improvements besides the designs for numberless town centers and civic groups. Recent congresses in London and Berlin were even more extensive. These exhibitions made it plain to all that the Germans have beyond any question been the pioneers and the leaders in these modern studies. Commercial cities like Düsseldorf, Mannheim, Frankfort, Cologne, Wiesbaden and Stuttgart are vying with one another to make their surroundings serviceable, orderly and beautiful, and to increase the happiness, health and well-being of their people. In Germany also more than elsewhere this city planning is done by experts. Town planning has there become a science and is treated as such.

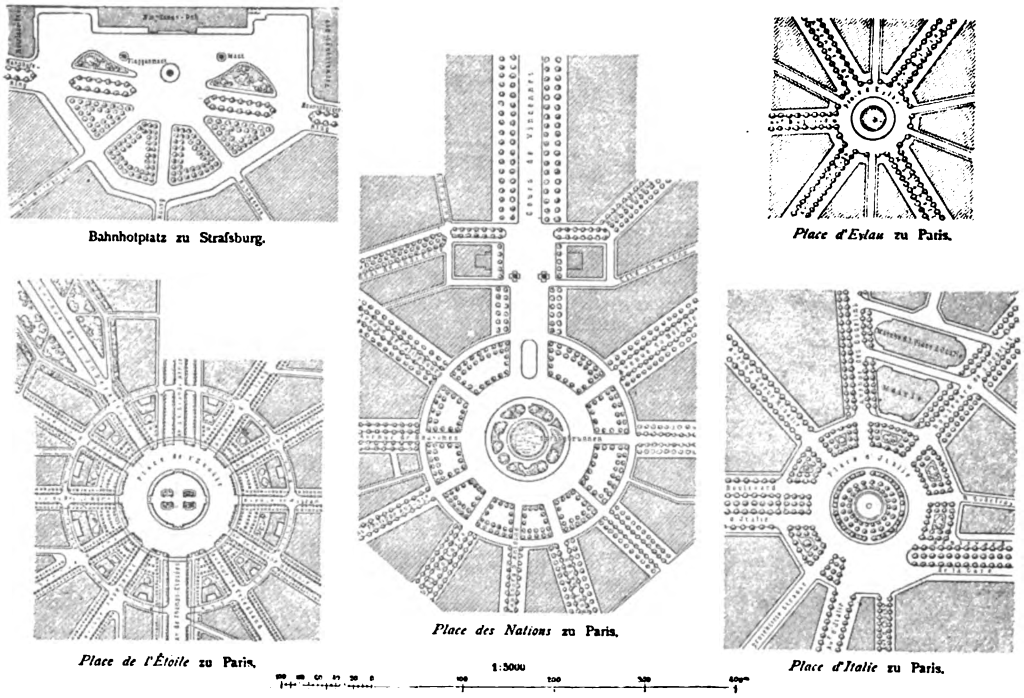
Accepting then the fact that these studies have seized upon the public mind and are worth while we next ask what is this "City Plan" which has so captivated the popular fancy, and what meaning has it? Mr. Brunner very aptly answers this question by saying

"WHAT CITY PLANNING DOES NOT MEAN.

"It does not mean the creation of a civic center and grouping public buildings;

"It does not mean the arrangement of streets and boulevards, nor perfecting the system of circulation and traffic;

"It does not mean the planting, the location of fountains and statues, nor the creation of great vistas;


Bahnhofplatz zu Straſsburg.
Place d'Eylau zu Paris.
Place de l'Étoile zu Paris.
Place des Nations zu Paris.
Place d'Italie zu Paris.

TRAFFIC CENTERS
FROM *Der Stadtbau* BY PROF. STÜBBEN

"It does not mean the formation of a park system with its connecting parkways and small city squares;

"It does not mean the treatment of the water-front, nor the solution of the railway problem with its arches, tunnels and terminals;

"It does not mean suburban development nor the creation of garden cities;

"It does not mean the location of school houses or playgrounds, either for children or grown-ups;

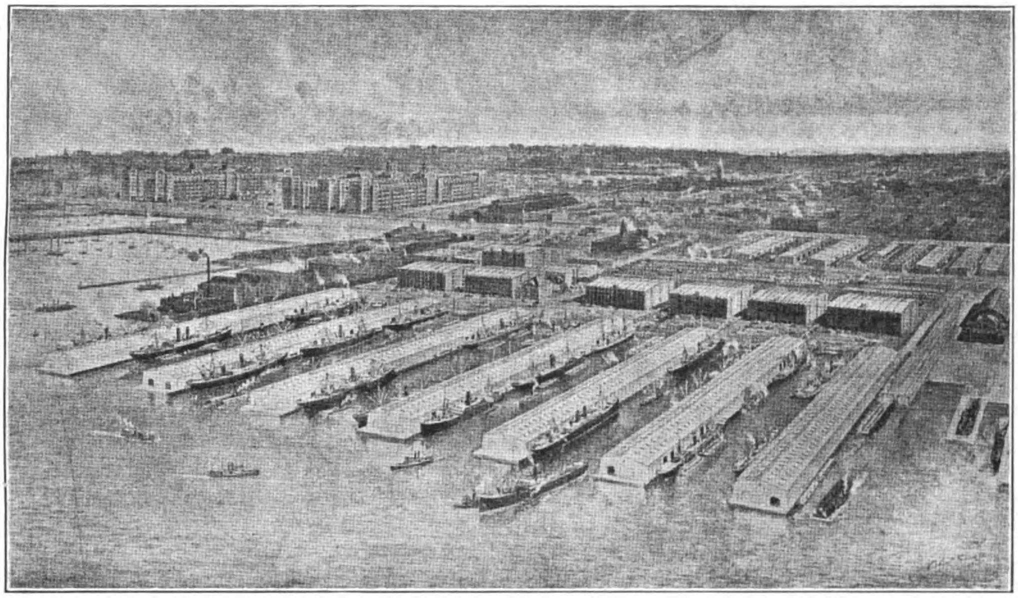
"It does not mean the method of bonding the cost of the improvements—the law of excess condemnation—the legislation required:

"It means all of them considered together, the business side of city planning not being neglected, and I believe the most practical result to be attained is not the beauty of the city, but the consequent elevation of the standard of citizenship."

In fact we rapidly discover on investigation that city planning like other things has various ramifications.

It may mean little but humble municipal house cleaning and good civic housekeeping in a city already built. It may mean the designing of better opportunities for trade and commerce or for the housing of the poor; and all this in turn may lead to additions to or changes in such a city, or to the designing of a quarter of the city, or the establishment of a civic center, or finally on rare occasions to the planning of an entire town or city.

The general principles that underlie a city plan evidently depend upon what the people do and how they live. From this will grow first and foremost a plan to make the town convenient for business; secondly it must be fit for residence and healthy; and finally beautiful. To make commerce easy we must have facilities for local and foreign transportation, permitting a ready transaction of business and hence prosperity. For this the essentials are railroads, docks and delivery roads. To make the city healthy and agreeable there must be economical and healthy homes. Finally, as the ultimate flower and result of what has gone before, there should be such a disposition of the physical city as will make it a fit and beautiful background for city life; the stage setting before which the life of the city is played.



BUSH TERMINAL COMPANY'S PIERS, WAREHOUSES, DISTRIBUTING RAILWAY AND FACTORIES ON THE SOUTH BROOKLYN WATER FRONT

The first need then is to make commerce easy by proper railroad and steamship connections with the rest of the world by land and sea. The docks must have piers long enough for great vessels and sheds large enough for the quick shifting of cargoes. In most foreign ports the docks are excavated in low land and are provided with tidal gates. The ideal dock is one where the tide has no exaggerated rise and fall and where therefore no gates are needed to control it; where the sheds are so large that the ingoing cargoes may be laid out in proper sequence; and where the railroads and teaming road reach all parts of the dock. Moreover, it should be in close proximity to store houses and factories. Indeed, the ideal dock on our coast is of this description and can be found and examined at the Bush Terminals in Brooklyn.

At a terminal or transhipment city besides the main entering railroads some method of intercommunication between them is also essential. This is accomplished either by a circuit railroad as in some cities, or by lighters on the water as in New York, or by a combination of the two. Too often this machinery for the distribution of merchandise is in the hands of large railroads or corporations who can crowd out the competition of other roads or control whole sections of country, but in practically every modern seaboard city that is keeping up with the march of improvement the machinery of the port at any rate is in the control of the public so that all commerce by land or sea may have a fair chance for the delivery and transhipment of goods.

Connected with the railroads must be good classification yards well outside of the city for sorting the arriving cars so that they may be sent in detail to the various different quarters of the city, and good delivery yards in these various quarters for delivering the goods from the cars for distribution through the city by teams and trucks.

The goods having reached the delivery yards by these varied means there is next needed a set of distributary streets for convenient carting. These must be radial roads in the main with occasional encircling circuit roads and of course their use soon extends from the distribution of merchandise to the intercommunication of the inhabitants themselves.

M. Henard of Paris has made interesting studies of the main thoroughfares or system of circulation in various cities. He points out that a tree but for disturbing causes would be perfectly regular. It would have a straight trunk and a symmetrical bouquet of boughs,—but shade or wind or lack of food often distorts it. It may have all the more character for the changes that come from such accidents. M. Henard in making his theoretic schemes has reversed the process of nature, and from the more or less tortuous and irregular facts has extracted the ideal theory that governs the plans of the different cities that he illustrates.

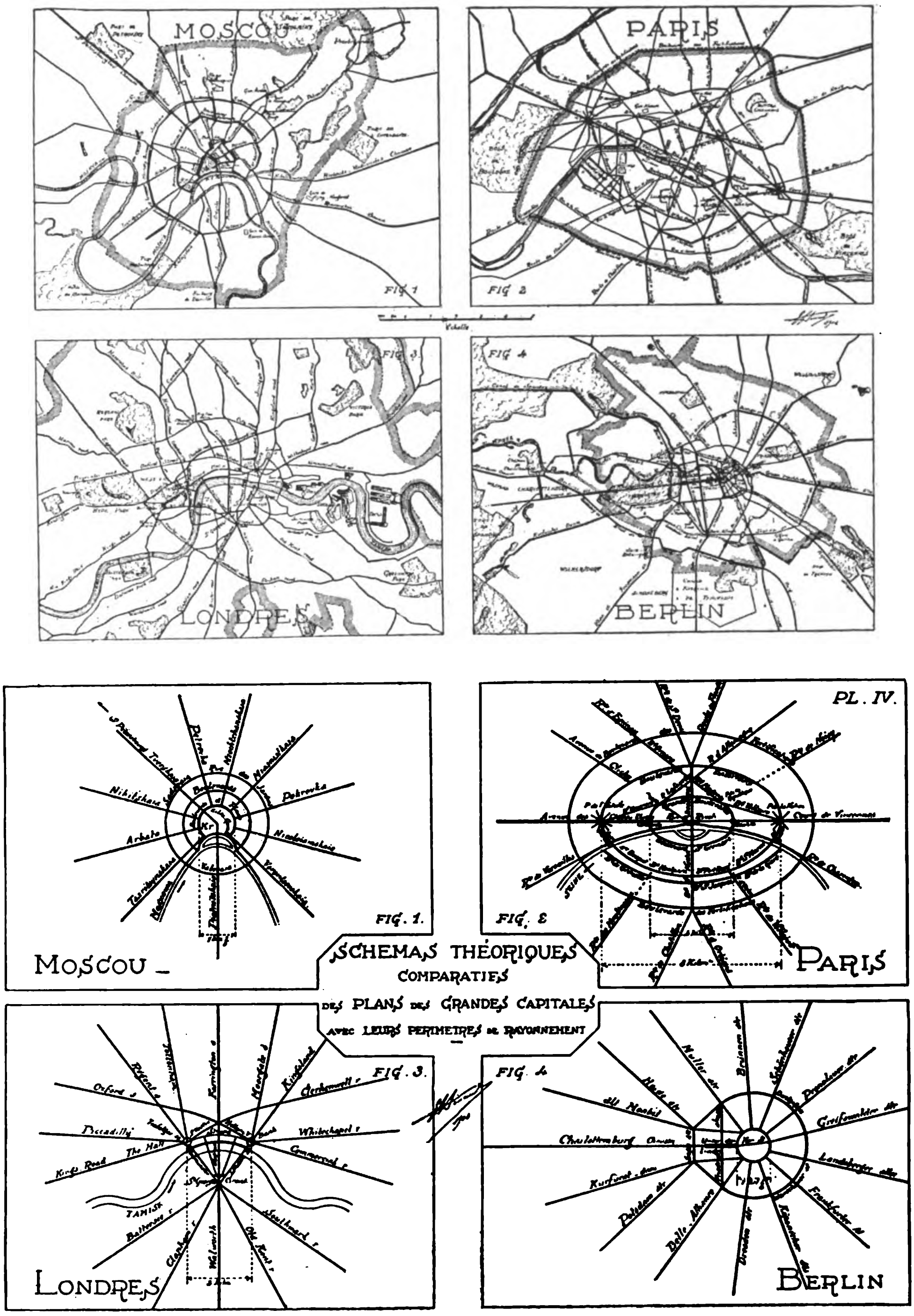
He shows how Moscow centers in and radiates from the Kremlin, the citadel of political, religious and military authority in Russia.

In Berlin fourteen great roads connected by a circle radiate from the seat of this military government and lend themselves to effective and economical expansion of the city on all sides—an expansion which is in vigorous progress.

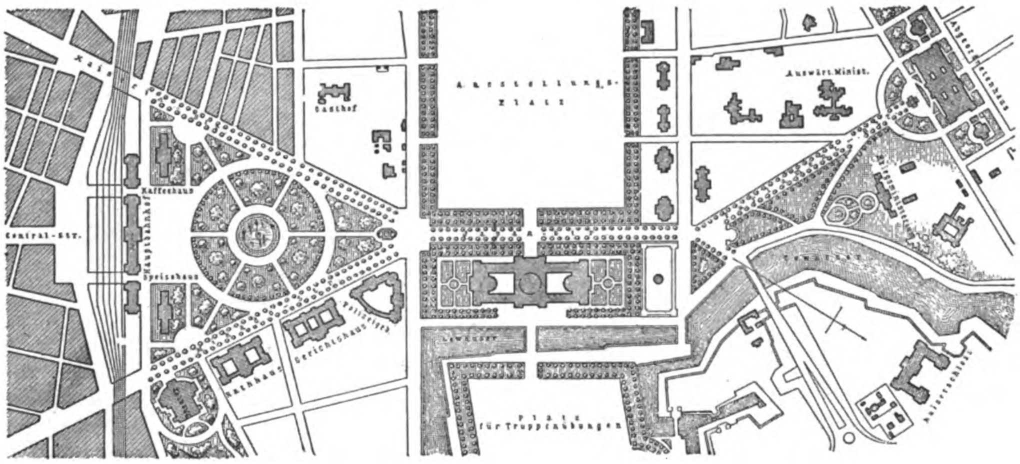
In London there are three principal civic centers: Trafalgar Square, the Bank and the Elephant and Castle. From the triangle thus bounded sixteen radial routes diverge. These, as in Berlin, lend themselves to city expansion, but London is deficient in circular boulevards, and the Parliamentary Commissions constantly endeavor to remedy this need.

Paris, on the other hand, has three circular boulevards, but is deficient in continuous radial avenues. Its great centers, the Arch of Triumph and the Place de la Nation, symbolize grandly military glory and the triumph of the Republic, but they serve no important currents of circulation. A study of these theoretic scheme-sketches shows how important it might be to a growing city to establish a large theoretic plan for its streets.

After commerce is established and prosperous by means of ports, railroad terminals and distributing thoroughfares, the next problem for consideration is found in economical and healthy housing and in that civic housekeeping which keeps all the city conveniences in the best of order. As time goes on our mu-



COMPARATIVE PLANS OF VARIOUS CITIES AND THEIR THEORETIC SCHEMES nicipalities may concern themselves to see that the citizens of all classes are properly housed. Many see in this the chief and main end to be reached by city planning. Cities might create special quarters for residence or special quarters for different classes of residence. At present our laws are merely restrictive and relate to the height of buildings, the area of land covered by buildings, prohibition of obnoxious occupation, etc. But if the housing problem has had comparatively little attention in most of our cities yet a great deal of energy has been usefully employed in the improvement of our cities by good civic housekeeping. Most of the reports on town planning so common today and much of what was shown in recent exhibitions lay most stress on such work. It is comparatively easy and inexpensive and it can work wonders. The main test is "Look ahead." Good civic housekeeping means close attention to work under the following heads:



PLAN OF THE CITY OF TOKIO
FROM *Der Stadtbau* BY PROF. STÜBBEN

Parks and playgrounds are the usual and well understood means of improving the surroundings of a town.

Provisions for water, gas, electricity and sewers are almost universal. Paved streets and sidewalks perhaps are less so. Then come subjects all of which tend to make living conditions better and more wholesome. Such as—

Tree planting for shade and the care of old trees perhaps in charge of a commission.

Neater systems of electric wires and poles, perhaps by carrying on one pole street lights, street names, letter box and fire box. Still better an enforced placing underground of a certain fair distance of conduit each year and the carrying of poles and wires through alleys where possible.

Reduction of the objects on the sidewalks such as show cases, clocks, advertisements, etc.

Establishment of public comfort stations, transfer stations, drinking fountains, waste cans, control of advertisements.

Establishment of building lines, of a percentage of lot areas that can be covdree without congestion, and the creation of manufacturing and residence sections.

Electricity on railroads and abatement of smoke; abolishment of grade crossings.

When business has been placed on firm foundations and in prosperous courses and when housing is healthy and comfortable, then and as the finishing touch to more material things comes in with prosperity attention to the beautiful. We all know that if the city is prosperous and convenient and healthy there is sure to be that sort of beauty that fitness inevitably produces. But the soul and the imagination demand something more, and the final object of our studies—an object that we can well have in view through all the early stages of city growth—is to produce this something. Were our cities perfect works of art one would find a pleasing picture wherever he turned, whether towards the great church, the public building, the monument, or simply down the street. On every hand would be agreeable impressions and a pleasing background for the life of the city. When the city is old and picturesque there is still an added interest, for "a beautiful old town represents an enormous artistic capital which pays ceaseless revenue in the form of grandiose or picturesque impressions." All that is old and beautiful should be, from its very rarity, a thousand times more precious to us than to dwellers in an older country. Indeed the history and social character of a town deserve every consideration. When we plan our city or its civic center and when the design can be controlled, it should continue and enforce the character which stamps the city as different from its neighbors. In making such designs, moreover, not only the relations of buildings in plan but their height relative to the width of squares and streets has artistic importance. In designing the various World's Fairs the relation of the height of the surrounding buildings to the width of the courts has been a vital feature. The Senate and House buildings at Washington, beautiful in themselves, would make a far more effective scene if nearer together. In Paris the Place de la Concorde was always large compared to the beautiful buildings that surround it, and now that the Tuileries are destroyed and the Court of the Louvre is opened up one is lost in the vast expanse and looks vainly for the enclosing frame. Boston Common is fenced with higher buildings around it than in former days, and to its great advantage so far as a general view is concerned. All is on a better scale. Then again if relations of width and height are important in individual details, how much more is it to be desired that the mass of the city itself should group with surrounding nature or culminate in its great monuments. Vistas and balance on plans are all good, but domination of leading features is a still greater item in effect. In the wonderful plans for Chicago the architects found no better way to create a startling effect than to make the whole design center upon an impossibly vast civic building. We all remember the dominating way in which St. Paul's rises above London, or in which the Government Buildings and the forts overshadow Edinburgh or Quebec. This large scaled grouping gives to those cities more of their grandeur than is obtained from their ground plans. Similar effects are obtained by the masses of the great cathedrals that tower above Amiens, Chartres, Lincoln and Ely.

That system of thoroughfares which we have seen is essential for business convenience when considered solely as a means of communication and traffic, from the point of view of artistic effect, is also fundamental. By their varied arrangements, whether picturesque and winding or whether axial and straight, its streets give memorable character of one or another sort to the city. When Baron Haussmann, with the power of Napoleon III behind him, renovated the city of Paris, he set a model for all city planning for a long while afterwards. Broad avenues led from column to arch, from arch to opera house, from opera house to palace, and from palace to church. Sometimes they were continued for long distances without interruption, but always they were lined with buildings of the same stone and of a fixed height, and bordered with trees all of the same kind and same size. Of course, this grand style was modeled in the spirit of Le Notre's garden work at Versailles, or Gabriel's in the Place de la Concorde, or Mansart's in the Place Vendome—in the spirit, in fact, that the Ecole des Beaux Arts nourished. But in plans of this older period, the broad schemes had been bounded and limited to spaces readily comprehended and enjoyed. Never before in cities that sought pictorial or architectural effects had streets been so continuous and vistas so long as in Baron Haussmann's Paris. It was even asserted that they were thus made that riots might the more easily be controlled. However, the city thus arranged proved so magnificent and so monumental that every French city, large and small, and many in other countries, forthwith endeavored to renovate their streets on similar lines.

But even from the artistic point of view which we are now considering these grand effects had their own troubles. The old Parisian boulevards (made by Louis XIV on the site of the ancient walls) were really interesting. They were wide and changed direction frequently; the buildings fronting on them had variety in height and alignment. But in the great renovation made by Baron Haussmann there was lack of individuality of expression in form and color, and little variety in the streets. The streets lack in surprises, and the constant repetition of the same type of house and the same trees and the same monotonous view tends to fatigue. The houses present a continous front without irregularity or individuality and the laws prevent gables and projections and compel a fixed height and a perfect alignment. The straight line triumphs, and writers do not mean it for a compliment when they say that this absence of accidental effects or silhouettes reduces their beautiful city to an American monotony and mediocrity. It is not unnatural that the Haussmannized Paris should find critics and the criticisms thus noted were often made. It is always so. There are two kinds of minds or of moods,—one that seeks the even balanced designs where individuality is sacrificed to the general effect; and another kind which hails every expression of individualism, every picturesque and varied incident. One is the attitude of the classicist, and the other of the romanticist. They seek different modes of expression in literature, in painting, and in all other forms of art. Northern and Saxon people tend to the latter; southern and Latin folk to the former. Reflected in their buildings these moods result on the one hand in Nuremberg, Siena, Oxford, Halberstadt, and on the other hand as a culminating product of the Latin spirit we have Paris. From these causes has sprung a school that criticizes Paris, or, perhaps even more, the feeble provincial imitations of Paris.

When Germany spent her new wealth in renovating and enlarging her ancient towns, she tore down their ancient walls and converted their site into boulevards, as in the old days Louis XIV had done for Paris. But the new German school refused to accept Baron Haussmann's artists as the infallible and only guides. The analytical, patient student mind of Germany, applying itself to the artistic treatment of these subjects, looked to past history and said: "The cities of ancient time, whose beauty we cherish and study, were not thus built. The Piazza della Signoria, the market square in Verona, the public places of Nuremberg, the Duomo group at Pisa, were not even or rectangular, but, on the contrary, very accidental. Michelangelo did not choose the center of the Piazza as the site for his David, but the side of it, where it was backed against the rugged walls of the Palazzo Vecchio. Even the Acropolis at Athens was not arranged with symmetry, and the forums of Pompeii were full of accidental effects. The charming streets of Bruges were not of interminable length, nor were they straight, nor did they end on a great monument. They were winding and with frequent and unexpected incidents in the way of market places, which they passed rather than traversed. When the cathedral came into view it was not lost in the middle of a plaza, and thus dwarfed by contrast as is today the Dom at Cologne or the west front of Notre Dame at Paris, but it was framed by the opening of the street and supported by the old houses that clustered against its sides, as at Chartres and Antwerp. Even in Rome of the Renaissance, where grand places like the Piazza del Popolo and the Piazza of Saint Peter's are axial, or in the balanced courts at Nancy and Versailles, regular composition is good partly because it has limits and good perspective effects, is self-contained and makes pictures that are easily comprehended."

To a world dominated by Baron Haussmann's views of city planning all this came like new light. It suddenly seemed clear that if straight streets are sometimes needed today, their use without artistic consideration of the ground or local circumstances is to be condemned. On the other hand if the waving line in streets is more picturesque, the straight line is more monumental. Neither one nor the other should be abused, but both should be appropriately used. Thus it happens that in recent German work like the belt which replaces the walls of Cologne the boulevard does not as designed by Professor Stübben move with extreme regularity, but from one interesting public place to another center that is quite different, giving unexpected and characteristic views of important buildings. The new German school, in short, seeks to give individual character to the street, the square, the monument, the building, the town.

It appears then that there are two quite marked and varying views as to the subject of what is beautiful in the planning of streets and thoroughfares and of monumental or picturesque vistas and sites, and that it is a subject well worthy the attention of the best of artists, although the authorities of most American cities would not recognize the need of anything but Yankee common sense for its solution.

But after all the most striking features of a civic plan are the civic centers. They are the focal points in the plan, the high lights of the picture, the chief objects of interest, the most obvious means of gaining effect. It was inevitable that in the civic Exhibitions the visionary designs for civic centers should compel attention. Town after town has paid large sums for exquisite drawings of more or less problematic schemes involving showy architecture at a civic center.

These overshadow those dull and dry details which are the source of vitality and from which alone can come the resources for embellishment. Just as a plant must have its root and stalk and leaves before the flower graces it to which all the rest lend strength and sustenance, so the business plan is the fundamental need in a city plan. But the civic center, though but a small part of a complete city plan, is as important as the flower to the plant. It is the final culmination of the city plan. These focal points are what we remember about a town, just as the pictures of them engross us at the exhibitions.

There is, however, nothing very complicated about the designing of a civic center. It is a charming problem, but comparatively straightforward, even when vast like the Place de la Concorde and the other Parisian centers, or like the Courts of the various World's Fairs which it might easily resemble. It involves only the skill for which the whole training of a good architect prepares him. Such centers can be better or worse. They can mar or give charm to the whole prospect, but the less inviting though necessary problems of town planning are infinitely more complicated and difficult. The civic center though vitally important is only a fractional part of a good city plan and is generally a straightforward simple architectural problem.

II.

EXAMPLES OF CIVIC IMPROVEMENTS

We have seen that the utilitarian city plan is founded on facilities for commerce. In America the most important of these facilities are the railroads and their terminals. European locomotives and trains seem like toys compared with what we see here. In 1900 the average freight train load in England was about 50 tons, a load which is sometimes here put on one car. Our locomotives sometimes weigh 125 tons and the Illinois Central Railroad has some trains of from 1000 to 1500 tons weight. American railway systems have therefore reached a much higher degee of efficiency than those of Europe and the need of railroad communication is omnipresent here and a matter of universal knowledge.

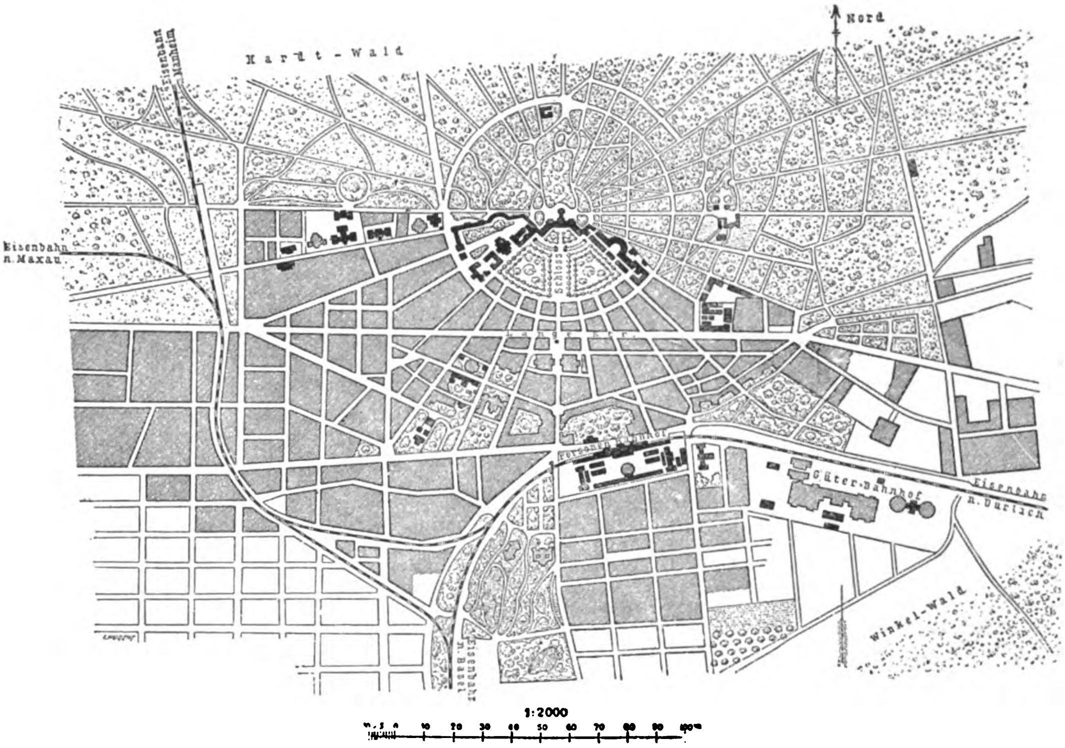
But the case is different with us as regards water carriage. What has answered for past generations has until lately been supposed to answer for today and thus New York, Boston, Baltimore and Philadelphia got wofully behind the rest of the world in port conveniences. Abroad the struggle for existence has built up ports like Rotterdam, Antwerp and Hamburg; and we find that in Europe port conveniences quite as much as railroads are fundamental elements of these city plans. In cities like Bruges, Brussels, Paris and Cologne where no port exists it has been thought necessary to create them, and where ports exist they are in all countries being improved.

London, long satisfied with antiquated conveniences, is now spending vast sums to recover trade taken from it by the vigorous continental ports. Once the low countries and the continent traded with London. The development of production, cheapening of transport, abolition of duties, increase of population, spread of wealth and introduction of steam factories altered the situation. As a result, London has embarked on vast schemes of dock consolidation and enlargement in spite of the opposition of dock owners who in imagination saw their capital vanish, and lightermen who drift up and down the Thames with the tides and thought their business endangered. In 1898 seventeen million dollars were spent on the Canada docks and in 1908 twenty million dollars were set aside for a new system of docks.

The improvements at Glasgow are perhaps more astonishing. One hundred and fifty years ago the trickling Clyde was crossed by stepping stones. Now the largest steamers are launched upon its banks.

While Europe was occupied by political troubles and America was fighting the Confederacy, Liverpool advanced to the first position as a port which today represents an investment of one hundred and fifty million dollars.

Newcastle and Middleborough and Hull have in the same way been made commercial ports and Manchester, grudging the onerous charges at the port of Liverpool, built a ship canal thirty-five and one-half miles long rising sixty feet six inches and having five miles of quay frontage and one hundred and fifty-two acres of quay area.



PLAN OF THE CITY OF KARLSRUHE
FROM *Der Stadtbau* BY PROF. STÜBBEN

Fifty years ago ships going to Rotterdam were partly discharged near the sea before they could reach port and ships sailing thither from the Indies took three and a half months for the voyage. On the completion of the Suez Canal the voyage was made in thirty-five days. Such ships could no longer waste a fortnight for a divided unloading and Holland built a "waterway" eighteen miles long piercing the Hook of Holland and offering free access to the Atlantic Ocean. Today new extended docks of enormous size are projected on the banks of the Maas.

Amsterdam once served by the Zuyder Zee built a canal fifteen miles long with a depth of thirty feet with tidal gates closing out the Atlantic at one side and the Zuyder Zee at the other side. The river thus barred forms a practically tideless basin at Amsterdam, convenient for commerce as the water level is almost constant.

Although Antwerp lives by ships and shipping, they are almost universally foreign ships. Like the United States she has practically no merchant ocean marine of her own, yet she has an apparently endless chain of docks; large as they are, however, they do not meet the ambitions of Antwerp. That town meditates a vast extention of docks somewhat lower down on the river Scheldt, one plan involving the cutting of a new bed for the river.

The most complete and finished modern port must be, however, Hamburg. The river has been deepened; enormous docks have been dug out of the solid fields that have bordered the river; they hold a tremendous inland commerce from the Elbe and the country waterways and the shipping that brings and carries merchandise to the ends of the earth. The docks are continuous, systematic, well ordered, completely fitted with machinery and filled with vessels from every clime.

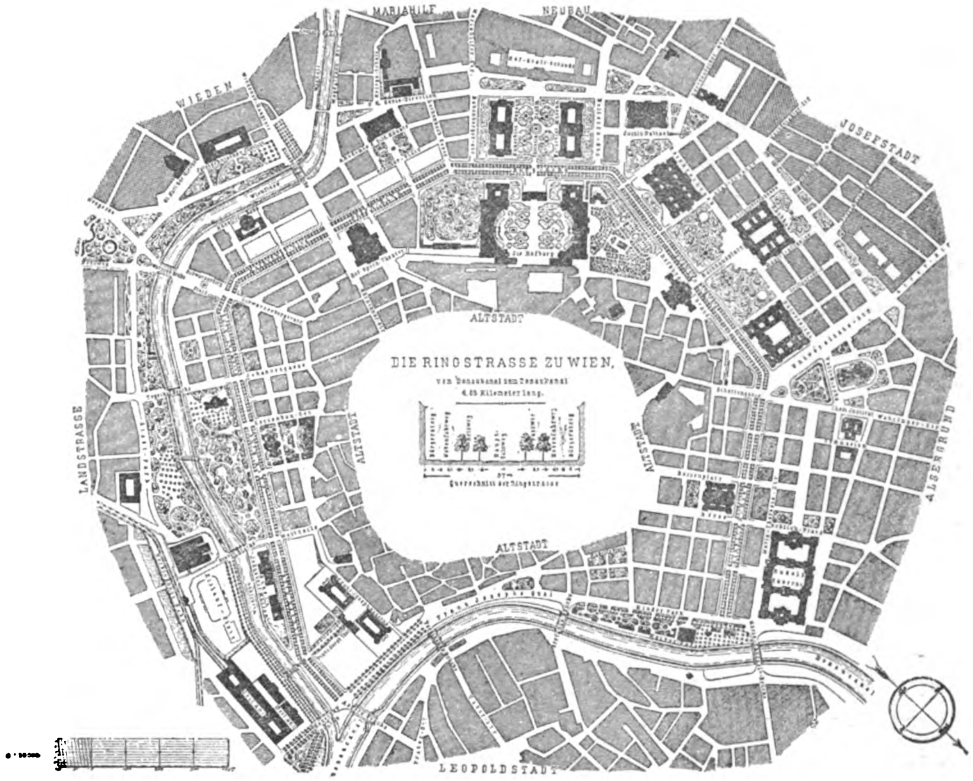
One does not think of Berlin and Paris as sea ports, but the traffic by water at those places is large. Napoleon III had many projects to make Paris a seaport. In fact the Seine has a ten and a half foot channel, floats a thousand ton barge to Paris and carries several million tons of merchandise annually.

Like the Seine, the Rhine has been improved and it has ceased to be a river for pleasure travel. It has become a mercantile waterway and ocean steamers sail from Cologne.

Here in America we have not until lately thought of harbor development as a subject intimately connected with town planning, possibly because the United States Government here undertakes the improvement of channels and ports. Although the development of interior waterways has been slow in America, yet necessities of commerce have aroused many old ports to activity. Montreal has spent large sums on docks and sheds and elevated tracks and drydocks. Galveston, Newport News, Philadelphia, Baltimore and Savannah and the Gulf ports all are giving active attention to this subject. New York is by degrees claiming a city ownership of the whole water front and contemplates great changes in the way of railroad distribution along the whole of the North River frontage. The recent reports of the dock commission outlined schemes for reclaiming large areas between Eighty-first and One Hundred and Twenty-ninth streets extending tracks over the reclaimed surfaces. Over the tracks roofs will extend which will form riverside parks, all resembling similar work at Antwerp. Further schemes contemplate the abolition of the New York Central tracks along the west side of commercial New York. Instead there would be substituted either nine immense car float stations on the water front, whence by switchbacks the cars from the Jersey and other railroads can rise and cross West Street to the second story of buildings on the west of that street; or, as an alternative, it is proposed to run an elevated freight railway for the whole length of the waterfront with connections to these car float landings on one side and to the second story of houses and factories on the other side.

Thus it is seen that both at home and abroad terminal facilities by sea and land are at the foundation of a city's progress and prosperity and development.

After terminal facilities both for railroad and water carriage have been established, the next consideration in developing a city by making commerce easy is communication across and around the city. Foreign cities have had an advantage in the building of new streets which belongs to no city in America. A moment came in most of these cities when the encircling fortifications were no longer useful. By taking them down place was furnished for encircling boulevards. It was in this manner that Vienna obtained the Ring strasse and that Paris gained the three rings of boulevards that connect her radial roads.



PLAN OF THE CITY OF VIENNA

FROM *Der Stadtbau* BY PROF. STÜBBEN

Antwerp, too, thus obtained a circle of boulevards. Here, too, a new circle of fortifications was built beyond the others and the intervening space is now occupied by a new and splendid city. Now there is talk of taking those down and Professor Stübben has been engaged to design a plan for the prospective new suburb. Cologne has extended its boundaries in very much the same way and under the guidance of Professor Stübben the surrounding belt of city has varied and interesting features. There is an agreeable variety in the streets. The old monuments are beautifully framed. Hamburg has received the same improvement, and not only is its convenience increased but also where it borders the Alster basin it is very charming. The shores are treated with foliage and coves and overhanging trees, and at the head of the basin are the hotels and the terraced landing where all day long and far into the night little steamers carry excursionists bound for more remote borders of the basin. Tree-bordered roads encircle the water and on the inner side are many of the best residences having a view through and over the trees but protected by them from glare. London one thinks of as bound by traditions and conventions beyond the possibility of radical improvements, but this is actually far from the fact. The question of communication across the crowded city has been a very pressing one, and there have been vast improvements in the streets within the last few years. Northumberland Avenue opened Charing Cross to the Thames, and then followed Shaftesbury Avenue and Charing Cross Road and Gray's Inn Road and the Holborn Viaduct; and three and one-half miles of a superb Thames embankment, partly reclaimed from the river, made the way clear from the Houses of Parliament to the Mansion House. Incidentally it gave a site for a low level sewer and made one of the most beautiful thoroughfares in the world. Lately, the King's Way has opened up the Strand to Holborn, and a superb mall has been built from Charing Cross to Buckingham Palace with radial avenues from the Monument in front of the palace conducting to Hyde Park Corner and other Park entrances.

England has never been able to accept unreservedly the classic influence. Even when she tries to be Parisian and lines the Kingsway with ill understood Parisian architecture, her old time topography defends her and the result is an agreeable crescent. But in another part of London we find a plan of the free and picturesque sort carried out, in a grandiose way. See the Thames Embankment sweeping by the busy river from where St. Paul's dome looms gray in the sea mist to where the Victoria Tower raises its noble bulk against a sunset sky. It is one of the finest views in Europe, quite the equal of Paris. Thanks to the winding ways and the unexpected surprises they present, it is full of local color and dependent on local conditions. It is therefore thoroughly in the spirit of the new German school, although created before the school existed.

With the endeavors of American cities to improve their thoroughfares and incidentally their city plans you are doubtless familiar. The plan of Washington is well known to us all. It is in great part a return to the original design by L'Enfant; although the Government has not adopted the plan it has adopted the principle that governs it and has thus set the example of monumental planning for her sister cities in the United States.

Philadelphia has made very complete studies for work in that city and has made good progress with actual work; so have St. Louis and San Francisco.

Buffalo, Chicago and Cleveland all owe their commercial importance to the opportunities they possess and have improved for land and water transportation and transhipment. In the development which prosperity has brought with it perhaps Cleveland has been the most successful for she is well advanced in the actual construction of a civic center. The city has occupied a district of dead property close to the main center of the town. On this land are either building or to be built the United States Government building, the Library, the City Hall and the Courts and the railway station. The latter will thus form a veritable municipal gateway by which the stranger will enter at once into the heart of the city. Chicago has lately surpassed all American cities in dreaming of a splendid future.

In the beautiful drawings that suggest improvements, the north and south parks are joined by a key built outside of a water front lagoon. One recognizes here a charming detail, worthy of all praise, quite possible of execution, and full of individual local character. On the other hand the immense radials which would necessarily cut through the finished city with little regard to obstacles, though they offer long vistas and form a perfectly geometrical plan and will doubtless be most useful, yet will be vastly expensive and suggest no local or individual character whatever. They would be equally suited to Chicago or to Buenos Ayres. These charming lagoons on the one hand and these long formal straight radials on the other hand, show well the two different schools of city planning.

III.

BOSTON AND THE QUESTION OF MUNICIPAL IMPROVEMENT

But if an example is sought close at hand of a city where commerce long held to old ways, but which saw the need of progress and studied with care the remedies; which, ancient and crowded, has grown beyond its early borders; where civic loyalty is strong and where with respect for the past there is also some thought for the future, such an example can be found here in this old city of Boston.

In 1909 the Metropolitan Improvement Commission made a laborious report as to the possible development of the metropolitan district. With unusual self restraint they denied themselves the pleasure of presenting beautiful pictures of an imaginary future city and confined themselves almost entirely to studies for the city's material development. They felt sure that with prosperity, attention to beauty would come without urging.

From Sketch by R. S. Peabody.

Those who are not rebuffed by the dry looks of a state report will find in the Report of this Commission almost a text book on the general subject of city planning. The Commision found the port antiquated and the railroad terminals unrelated. With the assistance of skilful engineers they recommended consolidation of all terminal interests in one authority, the gradual building of docks where the railroads could reach them, and a ready interchange between the railroads by a renovation of the circuit railroad and the establishment of float ferries. A fair beginning towards these improvements has been made by the appointment of a dock commision who control a large sum of money. Less success has attended the recommendations as to intercommunicating roads. Suburban jealousies stand in the way, but Mr. Shurtleff's study of the subject is an exhaustive and authoritative treatise and later when they cost more the suggested improvements will become necessary and be carried out.

STATE STREET, BOSTON
From Sketch by R. S. Peabody.

Boston is an old seaboard port. Its buildings are some ancient and quaint, some new and worthy rather than magnificent, for magnificence has never been in this town a passport to business or social success. An unequalled cordon of parks encircles it and on its shores the great salt ocean rises and falls with its health-bearing tides. Tourists flock through it, and though gently scoffing at its folk, really love and admire the town. The ancient narrow and winding streets climb and wander over its steep and frequent hills and the modern houses lie in long straight avenues on the plain beneath. Picturesque suburbs surround it, which some day will make a city like that on the hill, but with broader streets. Here then in one most attractive example are the wandering and individual type of city plan, and the other type that depends on orderly coordination and systematic cooperation; and this charming contrast of plan is the chief asse tthe

MILK STREET, BOSTON
From Sketch by R. S. Peabody.

city possesses in the way of beauty, the chief reason why it is so attractive and pleasing to stranger and to resident.

Boston is nigh on three hundred years old. Accordingly we are accustomed to thinking of it as a finished product, a completed city. Nothing is farther from the truth. It has a metropolitan population of a million people. It has a superb harbor, and is the terminal of many railroads. It has nothing but a range of hills separating it from all the western railroads, and not even selfish blunders on its own part can prevent its growth and prosperity, and with prosperity Boston will expand as never before. Cologne and many another German city, Antwerp, even Paris itself, were old when they razed their fortifications and built a new city between their old and new lines of defence. These innovations have really made them newer cities than Boston. But a like fate awaits Boston. The problem then is not with an old Boston, but with a Boston that is growing; that has not even reached adolescence.

From Sketch by R. S. Peabody.

Many of us regret the old unchanged Boston which was so delightful, but to speak the truth there was very little of it. The quiet English town that some of us recall with such pleasure closely encircled the State House and Park Street Church and ran a little way down Summer and Franklin Streets. Beyond this very restricted center there was really but little which possessed interest. I well remember Summer Street when the houses stood back from the road and were approached by avenues, their gardens stretching nearly to the Bulfinch crescent of houses in Franklin Street, and it is true that Church Green at the end of the street with its old London spire had some picturesque advantages over that part of Summer Street of today. Beacon Hill was a more quiet and dignified place of abode then than in these days of crowding shops and hooting motors. The old, the past Boston was most pleasing; but look about you. Is not Boston beautiful today? Is it not blessed with all the fundamental elements that go to the making of a picturesque and a beautiful city?

Is not he fortunate whose morning walk carries him today either down the green mall of Commonwealth Avenue, or along the Esplanade where the breeze comes fresh from the harbor and the gulls wheel and cry, and from where across the water the great bridge shines pearl gray against the morning sky? The shaded paths of the Common lead us to Tremont Street, and we may well ask whether even when Colonnade Row existed that street was as picturesque as it is today. As we enter the dim canyons beneath the steeple of Park Street Church, does not Park Street itself and the State House on the hill and King's Chapel set amid the graves of long ago seem worth cherishing? Pleasing as Franklin Street and Summer Street were, did they offer the citizen a better walk than this to his morning work on State street? Was King street itself, when lined with Georgian taverns, any more picturesque than it is today when the Georgian State House and the Greek banks, the subway stations and office buildings lend a busy variety to a most picturesque composition? Was the North End more entertaining when Cotton Mather or Paul Revere trod its winding lanes than it is today brightened by the earrings and crimson scarves of Genoa and Naples? State street, Congress street, Post Office square, Franklin street, the neighborhood of Quincy Market, the west side of Beacon Hill, and Copps Hill, thanks to an immensely pictorial plan, still continue interesting; and though our water front is archaic from a business point of view, do you really think it is less picturesque than when Boston shipping went to every sea? If you do, I think you cannot have frequented the fishing fleet at T Wharf. You cannot have seen the liners come in to our tangled wharves bearing in one hold the cargoes of a fleet of the old time sailing vessels.

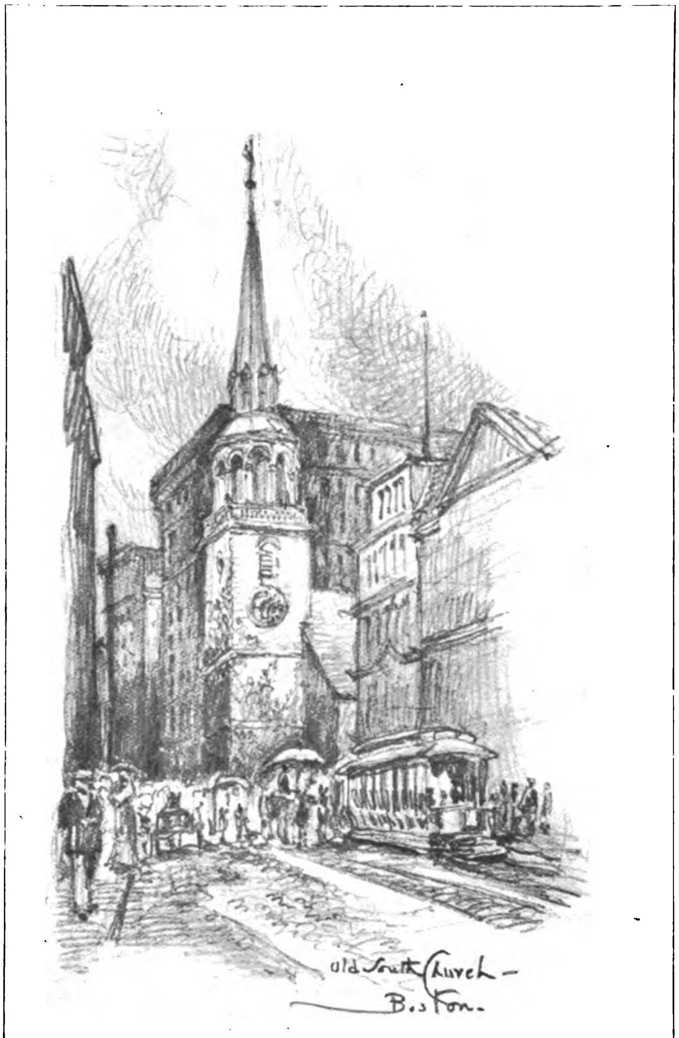
From Sketch by R. S. Peabody.

If the old town can hardly be spoiled as long as we can guard substantially its present topography, the new city on the Back Bay with Commonwealth Avenue as its backbone offers every opportunity that a formal plan can afford. There are many raw spots in both portions, many voids, many needs, but even our dearest friends are variable and by no means always at their best. There are days when the ocean is sullen, flat, uninteresting; until we live with it and see storm and sunshine, wind and weather transform it. Even Venice at times is a town of dilapidated buildings and ill smelling canals. In like manner we may at times find Boston unfinished, dirty, neglectful of her opportunities; in fact, Boston folk too often feel in this mood towards their surroundings; but should we prefer Chicago? Can the most enthusiastic resident of that vigorous city find anything in its tideless waters, its checquerboard streets, its lack of touch with the past, to create a real affection for the place itself? We envy Chicago its civic spirit, which even now is leading them to make it beautiful with those new lagoons on the lakeside that are finally to give it not only beauty but a character all its own. But Boston is different. If it lacks the civic spirit of Chicago, the future may remedy that deficiency, but the past cannot be taken from it. The city has beauty and character and charm that touch responsive chords within us. We think of Boston as a dearly loved personality and are tenderly fond of the old town. Chicago may spend its millions and make the most of such opportunities as it has; but how much more fortunate we are, for we start with old traditions, old monuments, old streets and hill and valley and salt sea wave and ocean shore.

CONGRESS STREET, BOSTON
From Sketch by R. S. Peabody.

THE CAPITOL AT WASHINGTON
From Sketch by R. S. Peabody.

Possibly these lectures should have dealt more strictly with such relations as architecture has with a civic plan. The exhibitions of city planning may be counted on to do that and to illustrate the subject with showy drawings. Hence it seemed worth while to give more attention to the utilitarian scheme on which a good civic plan must be founded and from which appropriate beauty must grow. At a school of art students are all too likely to think only of the artistic side of things. This is well enough for a painter or a sculptor. They are held by few material bonds. The architect is held by many. It is sometimes a burden to him that he must be guided by business considerations. It is his glory that he can see visions. But be he a prophet and a seer he is of no good as an architect unless all the while that he dreams he keeps his feet on the solid earth of common sense and utility. If this is so with an architect, it is far more so with a town planner, and that is why these lectures have to a large degree dealt with material things.



From Sketch by R. S. Peabody.

There is a sort of beauty wherever there is active, vigorous, manly life and where steam and electricity do the work of mammoths amid the hum of machinery and the bustle of commerce. Such centers of industry are often most picturesque. That sort of beauty we can expect without much forcing. It is true also that many picturesque and beautiful effects are the result of accident. It is true also that by care and vigilance we can expect to get good civic house-keeping and civic conveniences. But besides this a city is wise that has planned for the future with forethought, preparing opportunities not only for economical, practical and healthful conditions, but also for the long hoped for and much to be desired civic center and the handsome street and the picturesque square.

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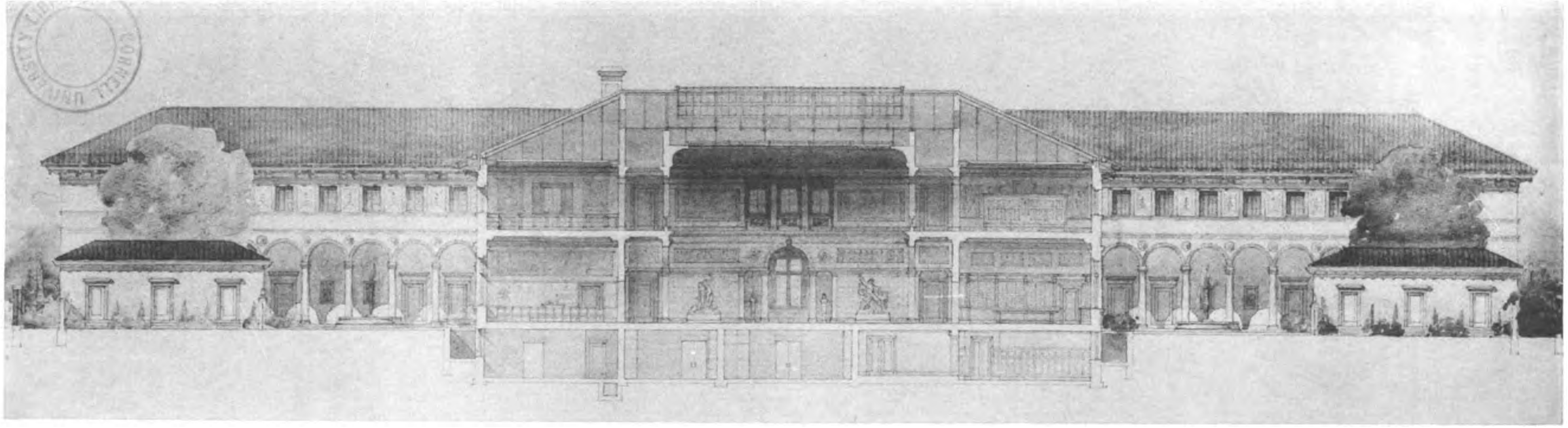
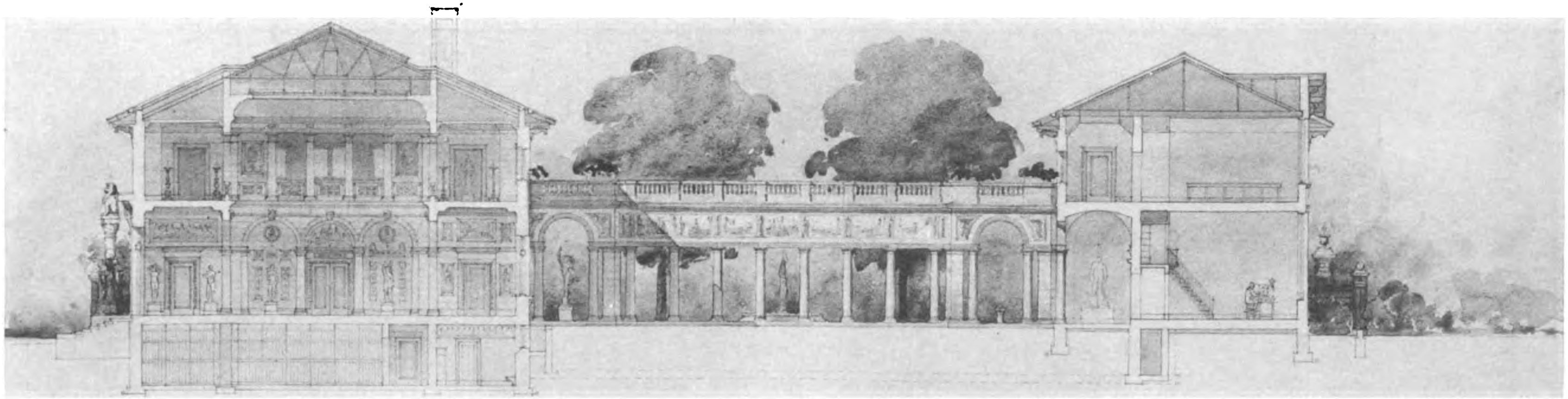


LONGITUDINAL SECTION



TRANSVERSE SECTION

A MUSEUM SCHOOL

THESIS DESIGN SUBMITTED FOR THE DEGREE OF M. IN ARCHITECTURE

BY ROGER GLADE RAND

Supplement to the
Architectural Quarterly of Harvard University,
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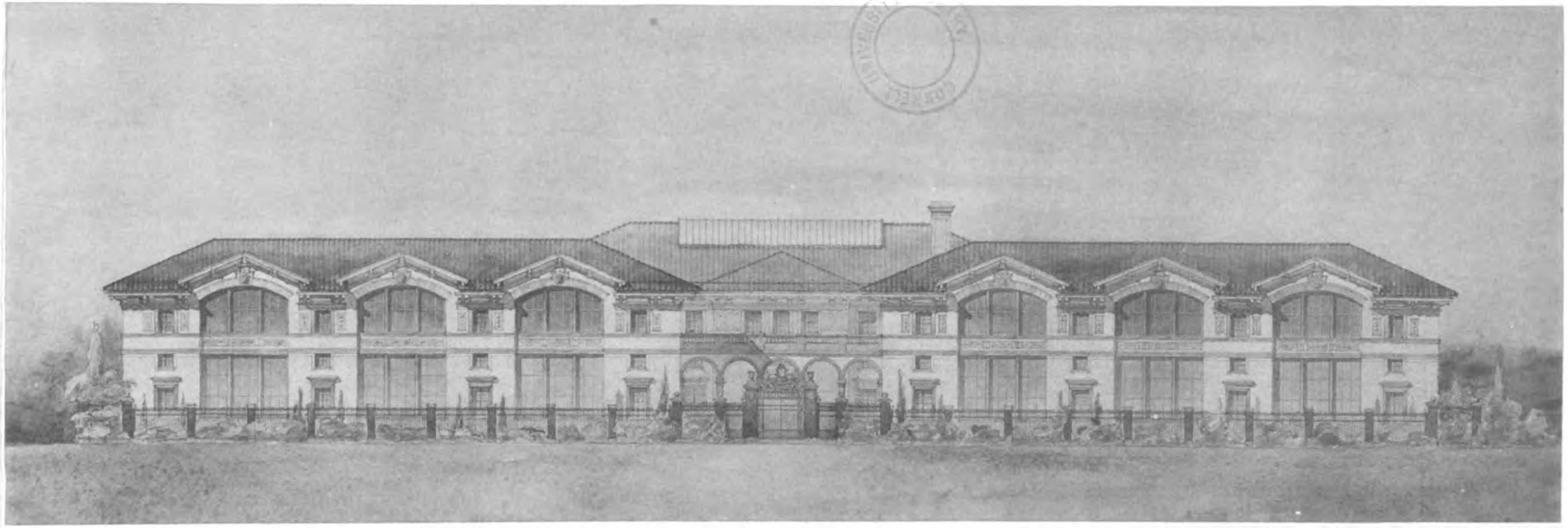

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[REAR ELEVATION]

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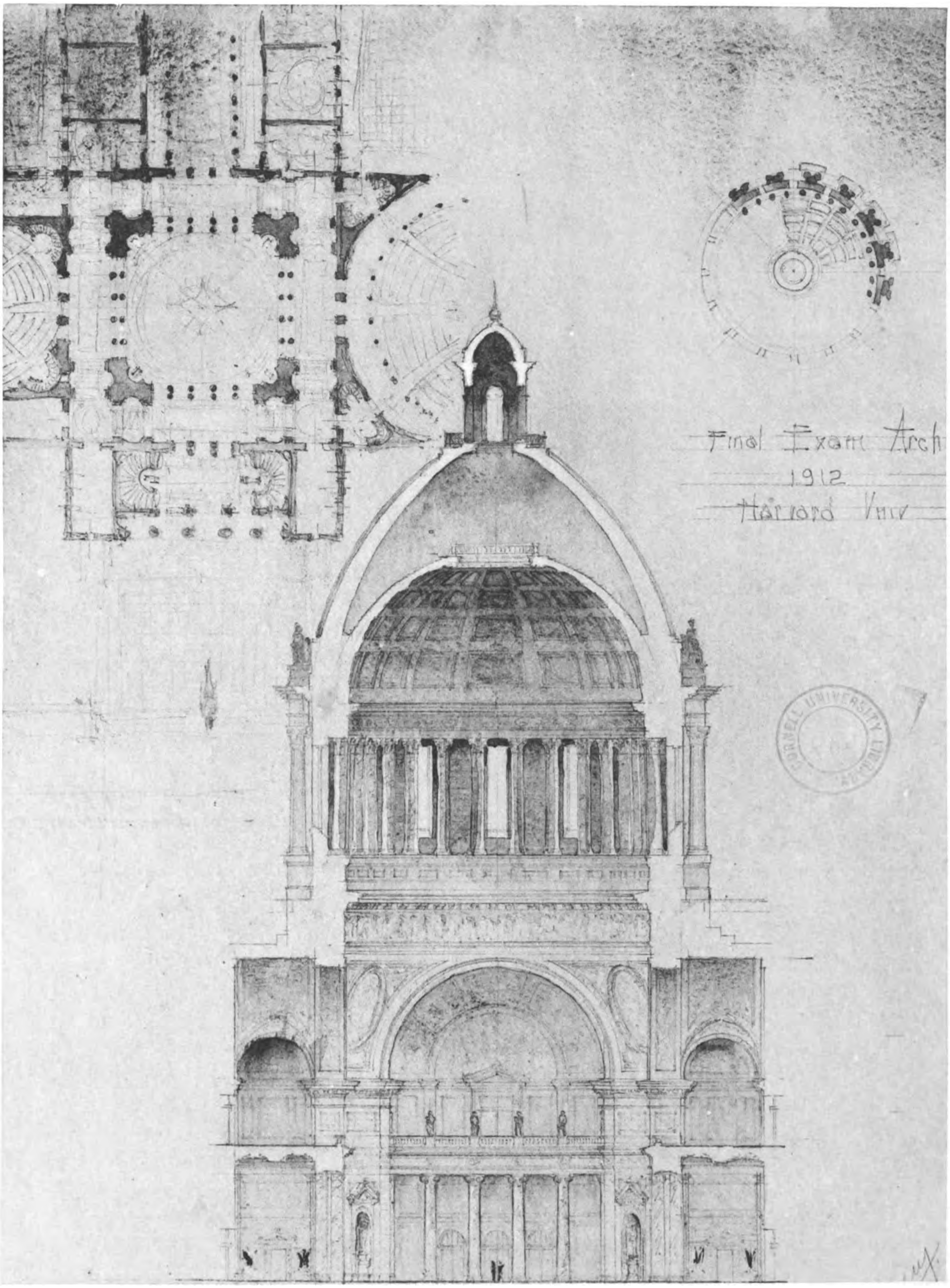

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THE ROTUNDA OF A STATE CAPITOL

TWELVE HOUR SKETCH

BY L. E. MOWERY

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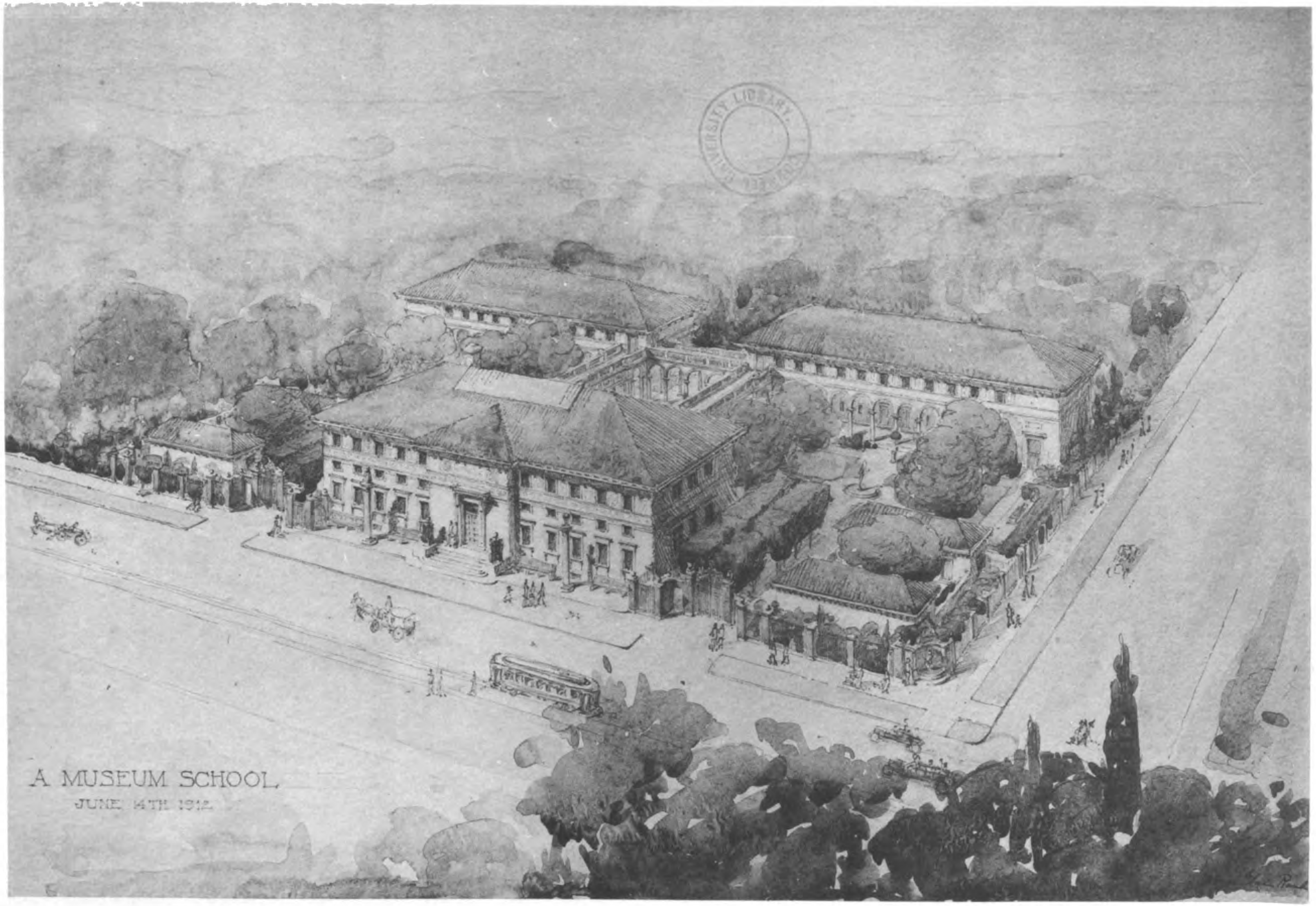

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[PERSPECTIVE VIEW]

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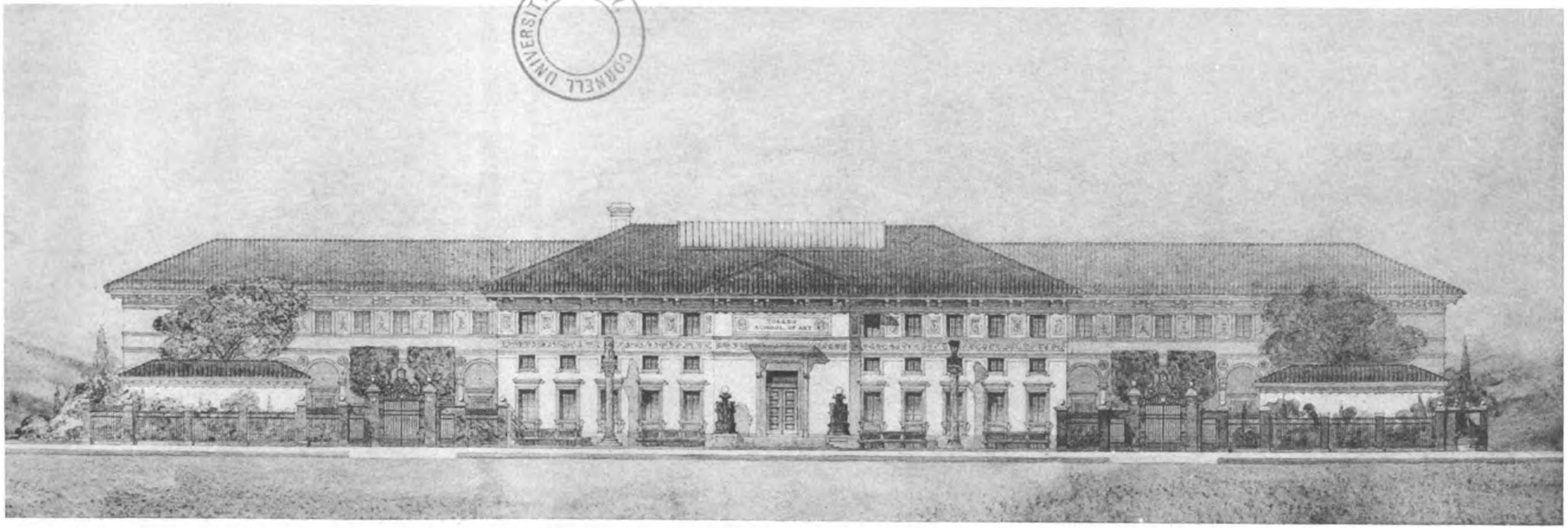

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[FRONT ELEVATION]

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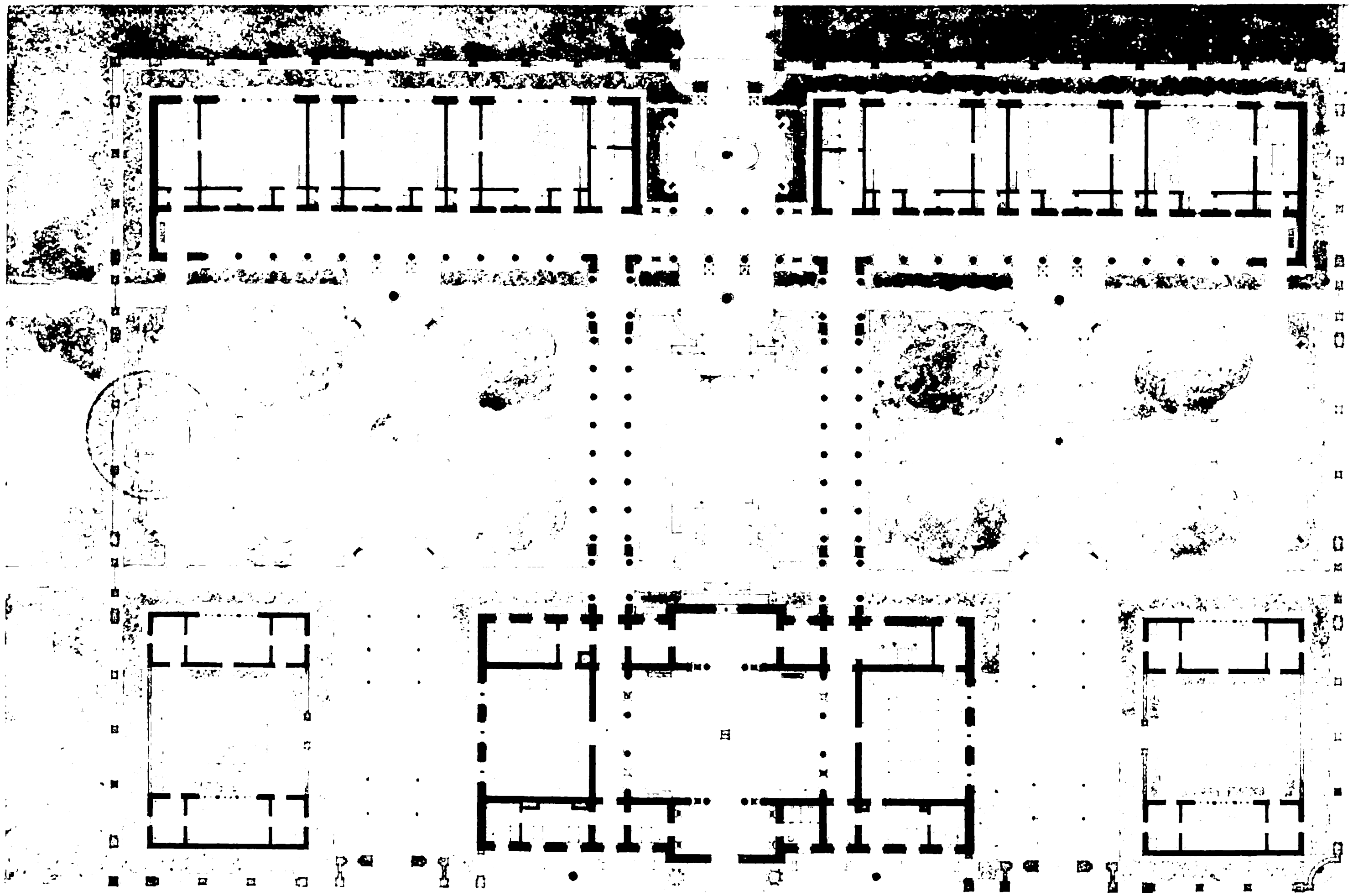

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[GENERAL PLAN]
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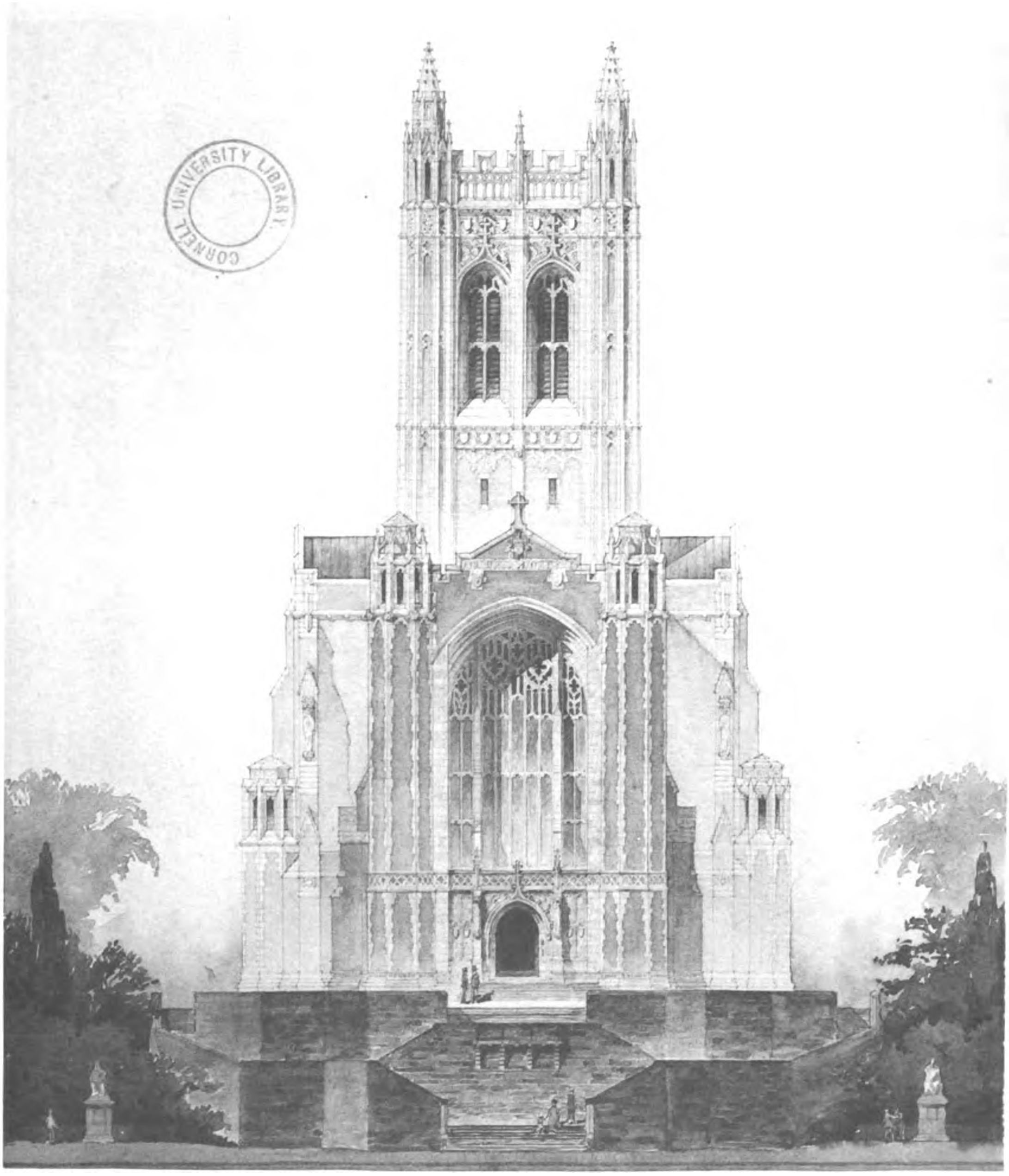

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BY RHODES ROBERTSON, M. IN ARCH. '10.

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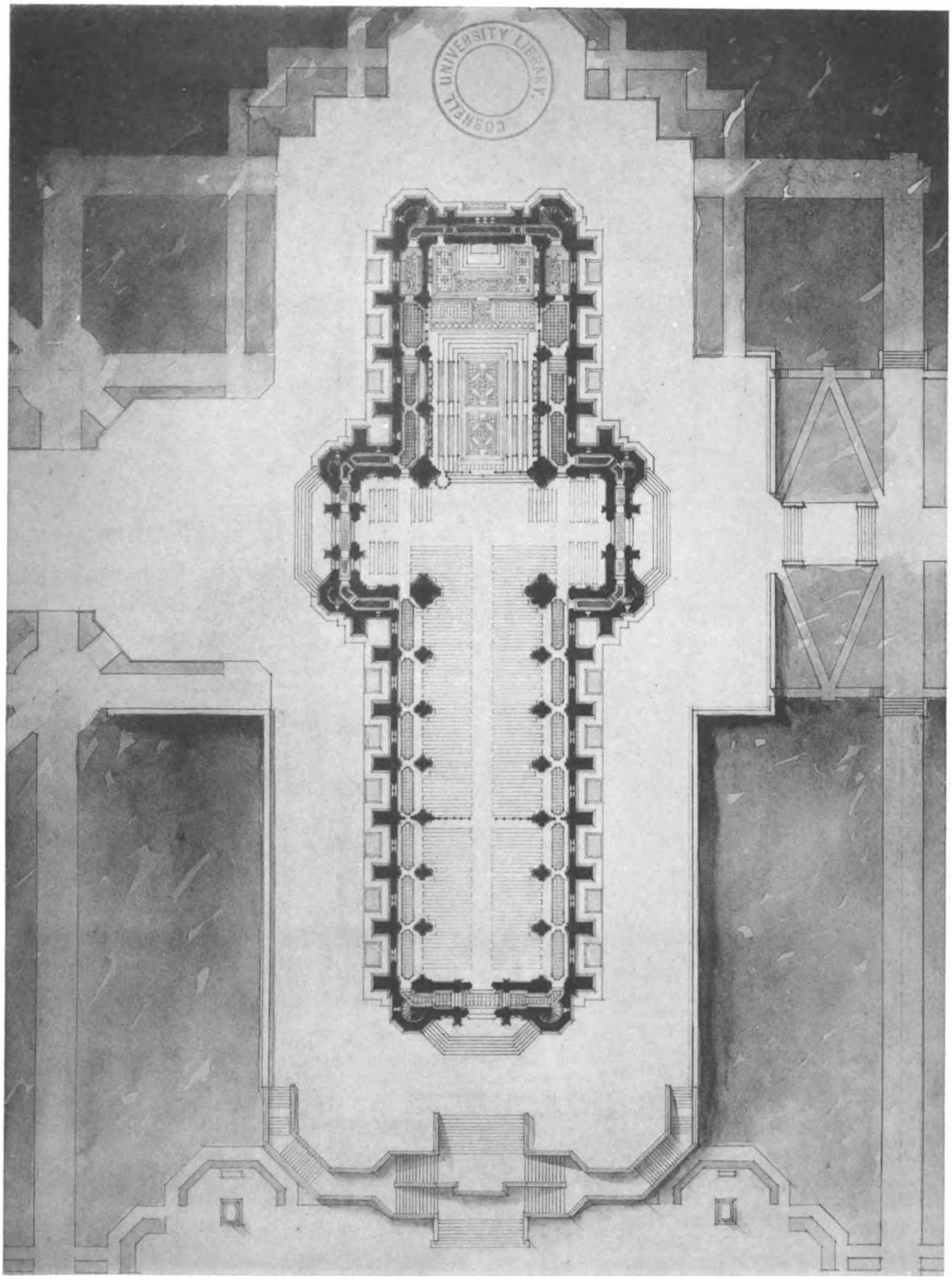

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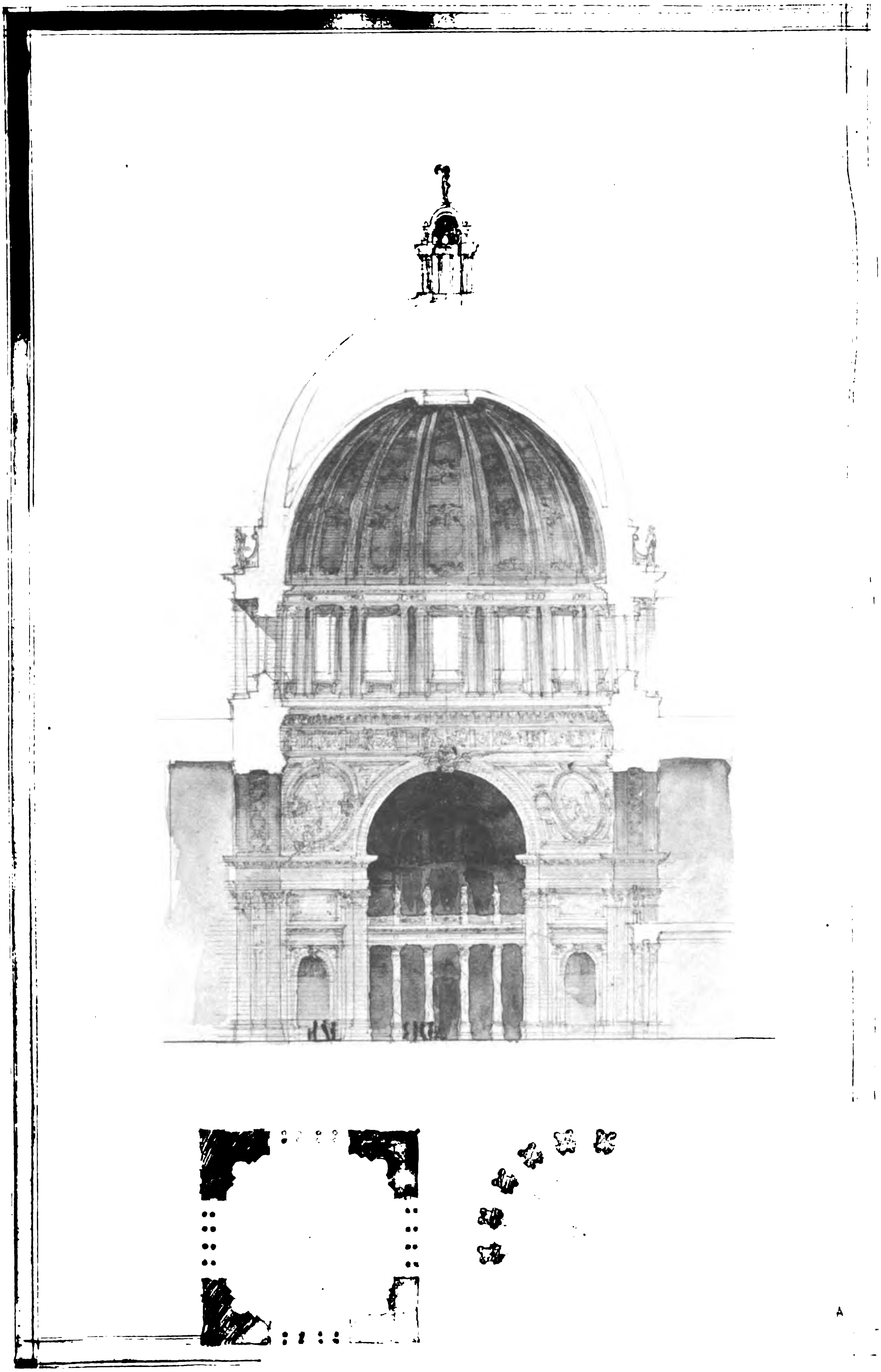

THE ROTUNDA OF A STATE CAPITOL

TWELVE HOUR SKETCH

BY HOWARD MOISE

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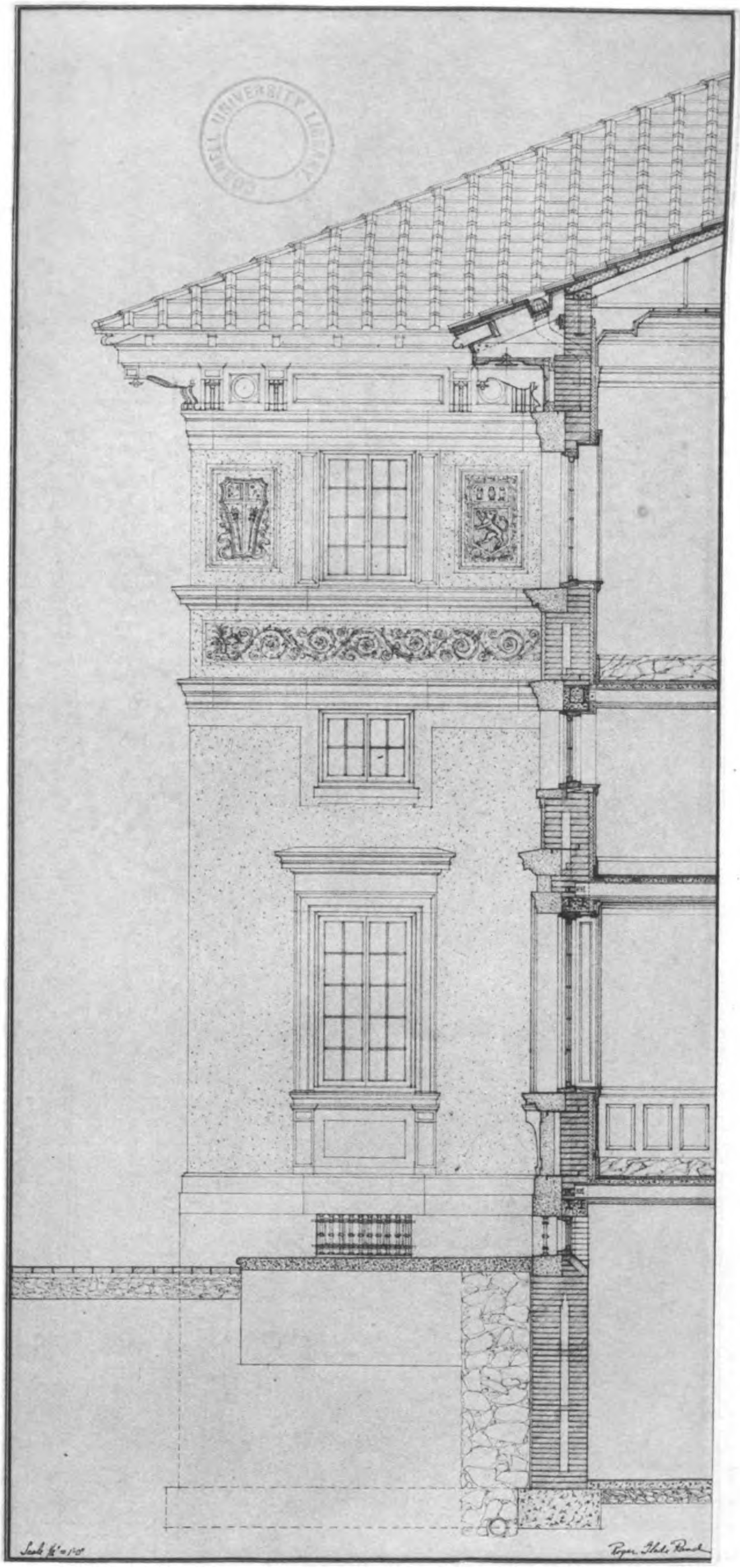

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[DETAIL]

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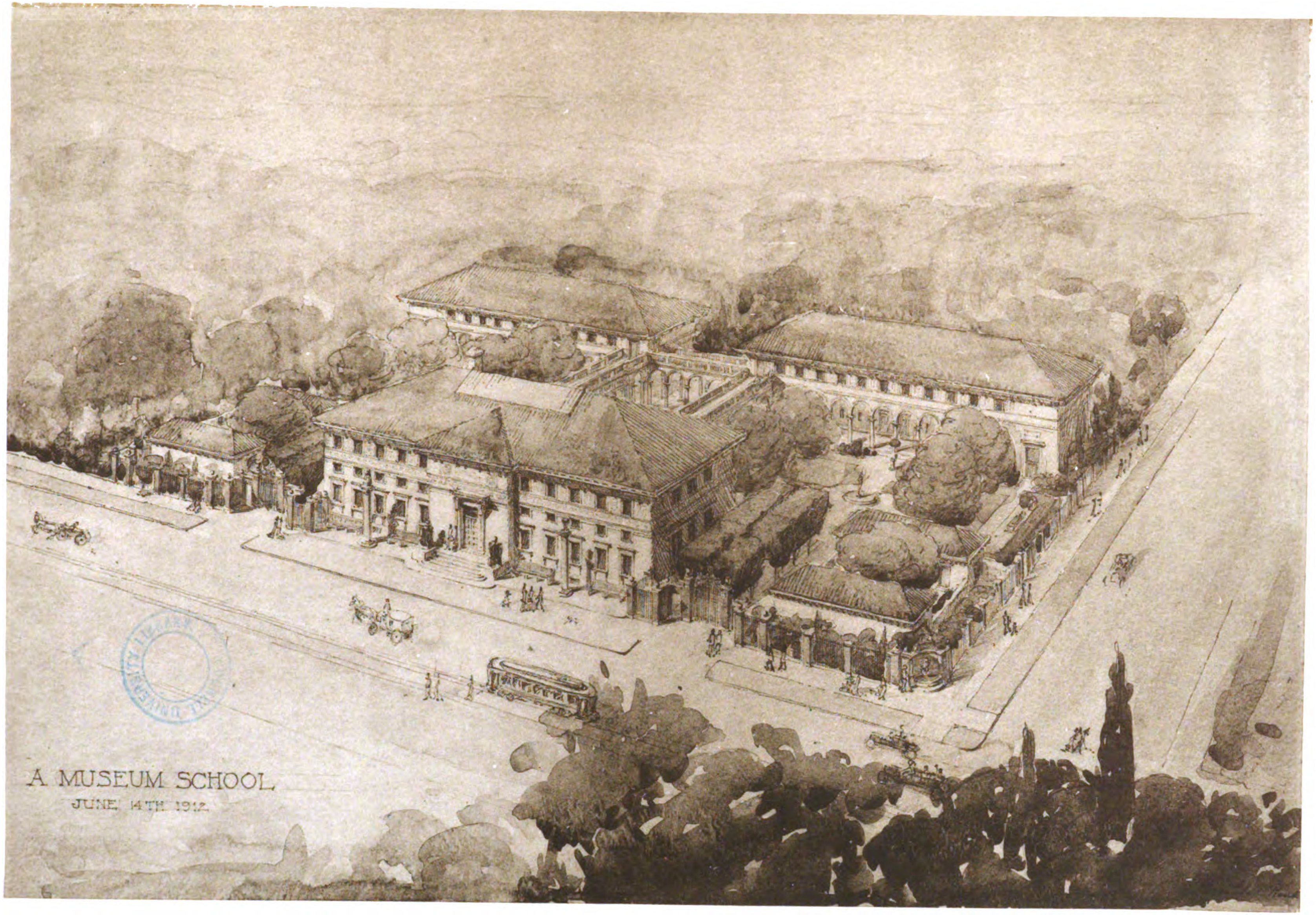

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[PERSPECTIVE VIEW]

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THE ARCHITECTURAL QUARTERLY
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VOLUME I DECEMBER MDCCCCXII NUMBER IV

⁂

BRICKWORK OF THE ANCIENT ROMAN TOMBS

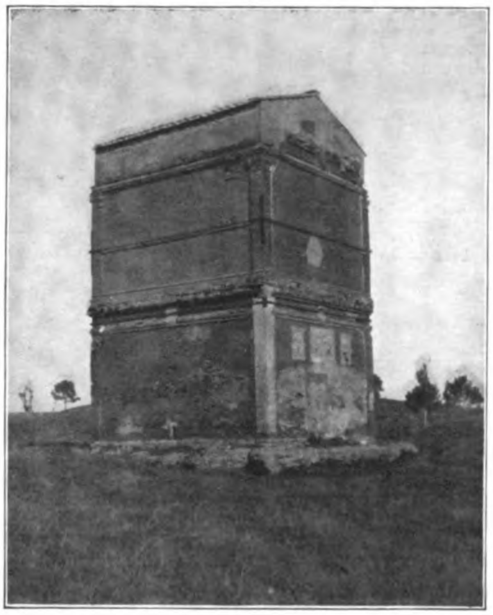
FELLOWSHIP THESIS BY
LEROY PAUL BURNHAM, S.M. IN ARCH '03.
ROBINSON TRAVELLING FELLOW IN ARCHITECTURE 1904 TO 1905.

ROMAN brickwork was not usually intended to be exposed to view; but was in most cases originally covered with stucco and then decorated with color and it was designed with this covering in view. There exist however structures which clearly show that they were not intended to be stucco covered. These examples are of peculiar interest, showing that the Roman craftsman had a sensitive feeling for the character of exposed brickwork when he chose to use it and knew perfectly how to get the utmost effect from his material both in form and color. In most cases the enrichments appear to have been carved in place, not moulded before burning the brick. Brickwork of this kind is found principally in the tombs of Via Latina just outside of Rome. Other examples of it which exist are found scattered about the Campagna in the vicinity of the Via Latina and the Via Appia although two examples still remain in a field near the Via Nomentana. No building of the kind seems to be left within the walls of Rome for the style was confined almost entirely to tombs and these were always built in the Campagna. In the Via Appia tombs were more usually finished in stone or marble although there are remains of some few brick ones; but in the Via Latina judging from what remains to-day brick was more used than stone and probably the whole street was lined with fine brick tombs.

The examples of the style here to be considered are three tombs on the Via Latina, one on the Via Appia Nuova, the church of St. Urbano and the so-called temple of Deus Rediculus.

They are always of a simple temple form, usually one story high but sometimes of two stories; in plan about square and sometimes with a prostyle portico. Oftentimes the basement is quite high and projects in front with a flight of steps leading up to the entrance. The windows are without exception small, placed high up in the wall and usually with a wide, elaborately carved enframement. In nearly every case there are Corinthian pilasters on the angles of the building carrying a fine classic entablature.

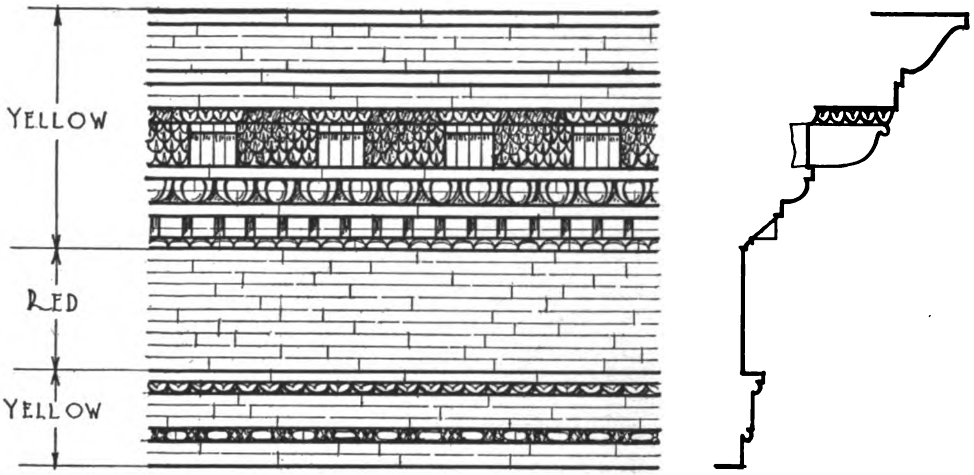
Bricks of two colors, yellow and red, are used in a most effective way, the wall being of one color and the order of the other. Sometimes the wall is entirely of red brick with yellow pilasters, architrave and cornice, as in the third tomb on the Via Latina, or the pilaster order is red and the walls yellow, as in the temple of Deus Rediculus and the tomb on the Via Appia Nuova. The brick is of a very hard and porous quality. The bricks are thin and long, about one and one-eighth inches thick and on an average eleven inches long. Some are longer than this. They vary in width as well as in length. Some are nearly square, but most of them are about half as wide as they are long. There is no regular bond. The bricks are for the most part used as stretchers, with headers inserted at irregular and not frequent intervals; but sometimes two headers occur side by side. The pilasters are laid with more regularity, alternate headers and stretchers in each course, and their width corresponds usually to the combined length of a stretcher and header, laying, as in the temple of Deus Rediculus, nine courses to twelve and one-half inches. Together with the brick, terracotta slabs are used in cases where a decorative panel larger than a single brick is wanted. These slabs are of about the same thickness as the bricks and of the same consistency or porosity, consequently receiving the chisel of the carver equally well. The carving is of a crisp deep-cut kind but always refined and delicate.


FIRST TOMB, VIA LATINA

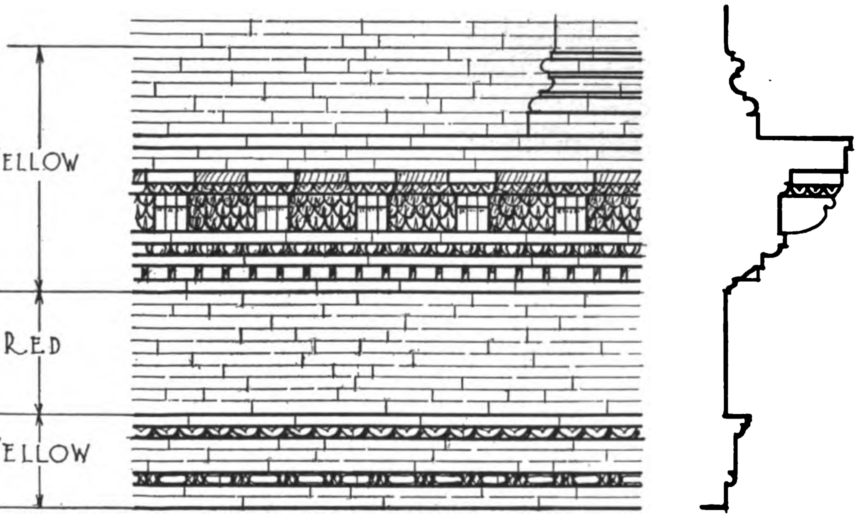
The first example to be considered is the First Tomb on the Via Latina. The distinctive features of this tomb can be seen from the photograph. It is two stories high and each story is treated with an order. The lower story is of the Corinthian order and its entablature is about the same height as that of the second story which is of a composite order. This is among existing examples the only case showing the use of the composite order or of any order other than the Corinthian. To make Corinthian or composite capitals out of bricks only one and one-eighth inches thick, seems at first like indulging in detail altogether too complicated and refined for brickwork, but the ingenuity and skill of some of these workmen made brickwork perfectly adapted to Corinthian detail with the result that these capitals are beautiful as well as interesting. However, in the case of this first tomb the carver's chisel went beyond the limitations of brickwork in cutting each little lobe and vein of the leaves deeper than the brittleness of the bricks could stand and the result today is, of course, that all the projections are broken off. This is in marked contrast to the capitals of the third tomb which was more simply done and consequently remain today in a state of perfect preservation.

The color arrangement in the first tomb is different from the others in having yellow capitals on red pilasters; everything being red except the capitals, architrave and cornices. The two cornices of the first and second stories are

BRICK ENTABLATURES FROM
VIA LATINA 1ST TOMB ON RIGHT
SCALE 1 FT
MEASURED BY L. P. BURNHAM



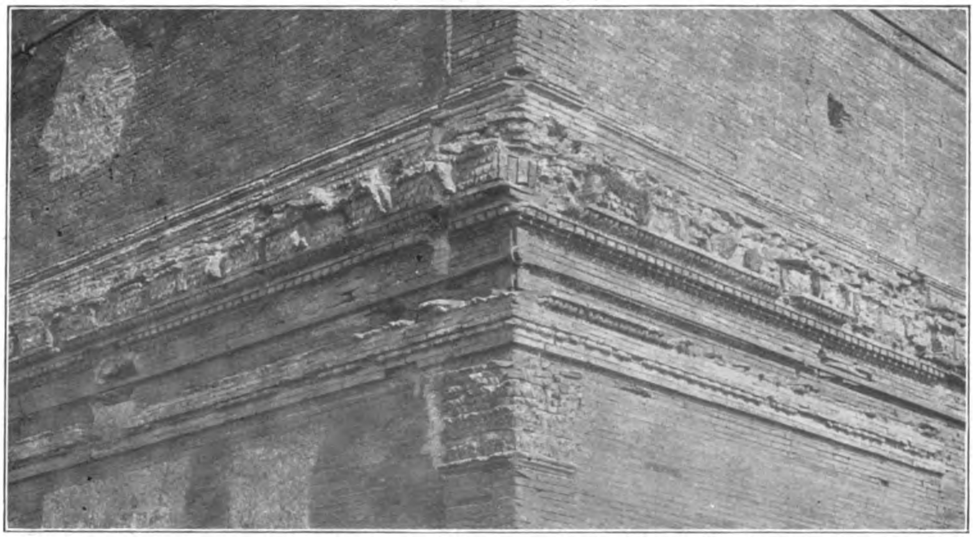
UPPER ENTABLATURE



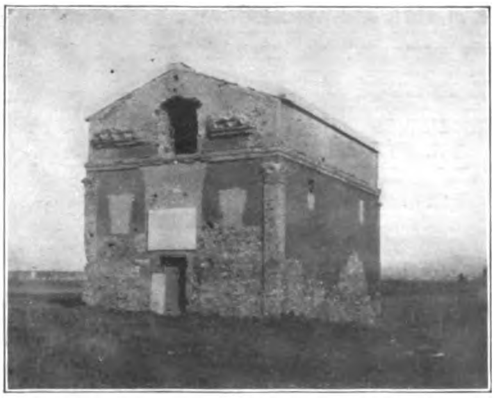
LOWER ENTABLATURE

of nearly the same mouldings. The difference, which is best seen in the drawing, is that the cyma is omitted in the lower cornice, and the dentil and the egg and dart moulding have each only one brick course whereas in the upper they each have two courses.

As the photograph shows, there is a very charming panel treatment in the space between the modillions of the cornice. It is simply this: one brick is laid flatwise in each intermodillion space and its face is carved with a little motive of overlapping leaves, the motive being applied also to the curved surface of the bedmould directly above the panels. This is a detail that is found in all the better designed tombs. It was a very natural way of decorating the space and the motive of the overlapping leaves is perfectly adapted to the decoration of a small flat surface such as the intermodillion space. If it were applied to a larger space it would lose its value and tell only as a flat surface but here it is justly and properly used and is in perfect scale and harmony with the neighboring mouldings, keeping the flat surface of the panel but at the same time breaking it up just enough to make a pretty little bit of detail up in the shadow of the cornice.



DETAIL OF FIRST TOMB, VIA LATINA

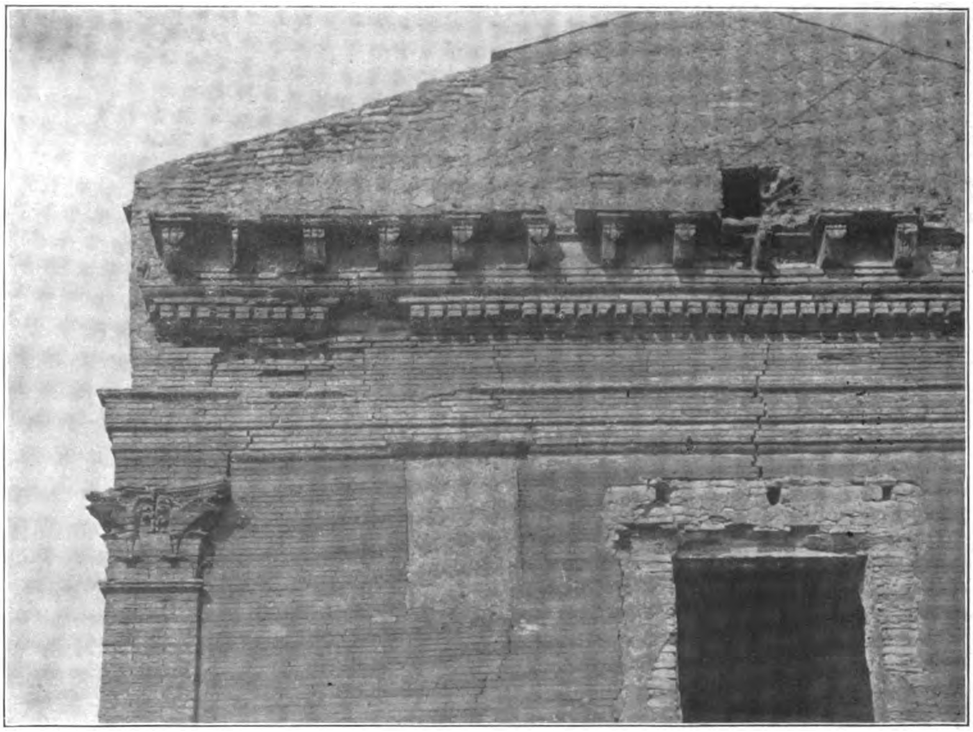


THIRD TOMB, VIA LATINA

In general proportion this tomb is rather awkward, its two stories being about the same height and its two cornices treated with about the same importance. Furthermore the temple form of building is not naturally two storied; the effect is that a simple complete temple has been raised up and another story placed under it. The design therefore lacks unity.

More fortunate in its proportions is the second tomb. It is as high as the first, in fact it is a two storied building, but is treated in a more unified way with one main cornice at the top so that it has none of the awkwardness of the first tomb. Unfortunately, nothing of the remaining superstructure is of the old work. It is rebuilt in a modern brick of another color, size and shape from the ancient work and its detail is consequently of no value.

A little further along the Via Latina stands the third tomb, a simple little temple-form building of one story with the usual Corinthian pilaster order on the angles. The color arrangement is just the reverse of that of the Deus Rediculus in that the red brick is confined to the walls and frieze leaving the pilasters, architrave and cornice in yellow. One thing occurs here that is in no other tomb and that is that the entablature does not rest directly on the capital. There are four brick courses introduced between, breaking from the wall the same distance as the pilaster; there is also a bed mould of one brick course under the projection of the architrave from the wall. The effect of the four brick courses between the capital and the architrave is, however, bad, for one feels that these courses are part of the pilaster strip and that its capital is not at the top of it.



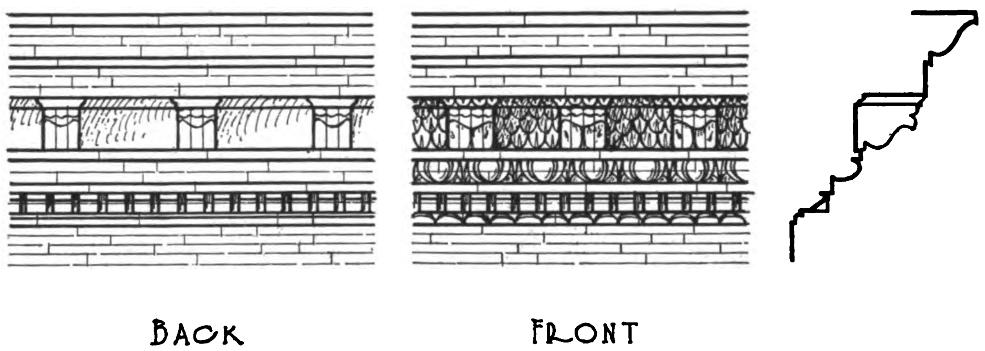
DETAIL OF THIRD TOMB, VIA LATINA

Nevertheless, the most interesting feature of this tomb is its capitals. There are two in a perfect state of preservation which show how well the Corinthian form of capital can be adapted to brickwork. Here, as the photograph shows, the leaves of the capital are left in their simple, big forms without any veins or small lobes whatever, which undoubtedly accounts for the good condition in which they have come down to us. It can also be seen how each member of the capital has just an even number of brick-courses, for example the astragal has two, each row of leaves has four, the abacus has two, etc.

It is quite evident that the capitals were carved after the bricks were set in place in the building. Thus the possibilities and the limitations of the material forced themselves upon the workman as he set out to cut Corinthian leaves in brick and this accounts for the pleasant relation between the treatment of the capital and the material in which these are executed.

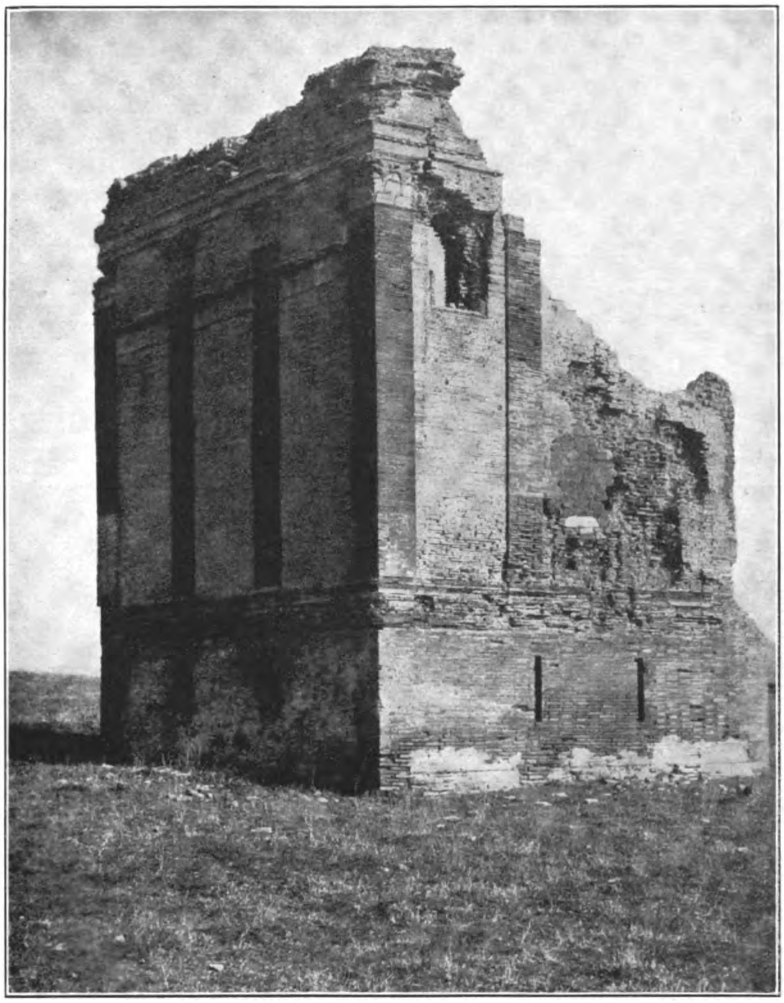
In the main cornice of this tomb there is further evidence that the detail was cut after the brick was laid. Here we find a full cornice with modillions, carved panels between them, egg and dart, dentils, and a decorated dentil bed mould. This however occurs only on the front of the tomb, for on the rear the same cornice is left without decoration. The modillions here are not carved, the panels between are blank, the egg and dart is uncut, the dentil bed mould undetailed, and even the modillions are of three bricks instead of four as they are on the front. All this is perfectly natural, for the back being away from the street was seldom seen and the workman thought it unnecessary to cut so much detail, so improved his opportunity to economize labor. Since there is no small carving on this part of the cornice it is quite possible that the bricks were moulded so as to give the required profile before they were set in place in the cornice; and it is probable that all the cornices or other moulding were moulded in this way to make as nearly as possible the desired profile, then set in their places and lastly cut with smaller detail such as egg and dart, leaves or whatever decoration might be desired. In this method of building it would be quite natural to omit carving detail on parts that were not much seen. Another instance of cleverness in handling brick construction manifests itself in the way the modillions are made. Any member which projects much from the wall would seem to be a bad subject for brick work and it was simply their cleverness that made modillions so entirely practical. To begin with they made the projection less than it would be in stone. Then the modillion was composed of three or more usually four bricks set

BRICK CORNICE FROM THE
VIA LATINA 3RD TOMB ON RIGHT
SCALE 1FT
MEASURED BY L. P. BURNHAM



vertically on edge so as to get the greatest possible cantilever strength out of each brick; the space between the modillions then was filled with a single brick laid flatwise giving a good continuous surface to decorate as was usually done with overlapping leaves. Both the photograph and the drawing show this construction more clearly than words can describe it.

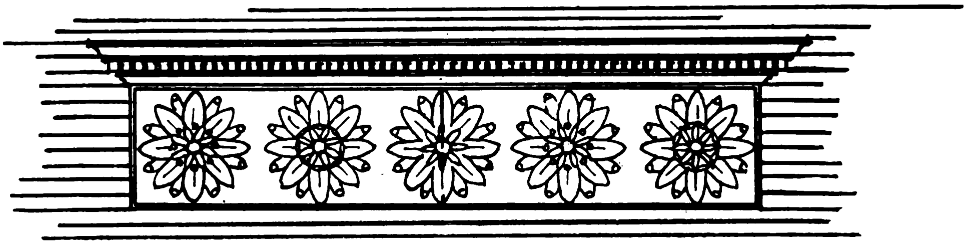
About two miles further out on the Campagna from the Via Latina stand the scanty remains of an excellent little brick tomb on the Via Appia Nuova.



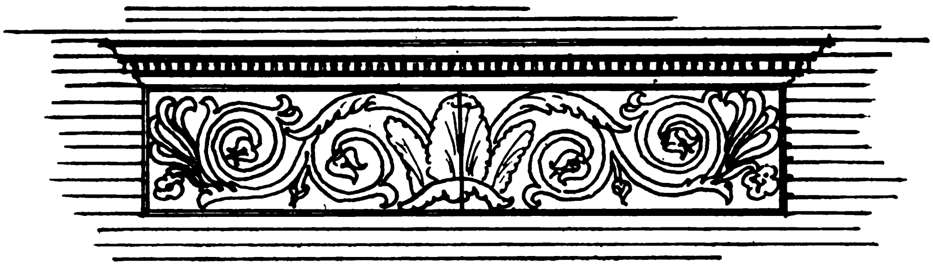
TOMB ON THE VIA APPIA NUOVA

Unfortunately the rear wall is the only part of the ruin which remains intact from the ground up to the bottom of the cornice, and above this there is no suggestion of what was done, but there must have been a simple pediment. This one completely remaining wall however is sufficient to show that this was one of the finest of the brick tombs, in its dignity of proportion and refinement of detail even rivaling the temple of Deus Rediculus. This wall depends for its effect upon the fine tall proportions into which the pilasters divide it and the charming terracotta panels which are placed high up in the wall space. In fact no other such panels as these are found in any tomb; the nearest approach to them being in the Deus Rediculus where a Greek fret panel is used as a decorative sill course beneath the windows; and it is not well placed for it divides the height of the wall in the middle, whereas in this wall on the Via Appia Nuova there are no windows and the panels are used merely for their own decorative effect and are placed with fine judgement as regards the division of the wall space. Each of these panels has a little cornice of three brick courses over it. The middle panel has, as best may be seen in the drawing, a Roman scroll design carved on it and the other two each have a series of five rosettes or daisies placed along in a row. The re-

TERRA-COTTA PANELS FROM
TOMB IN VIA APPIA NUOVA ROME
Scale 1ft.
MEASURED + DRAWN BY L.P. BURNHAM.



SIDES



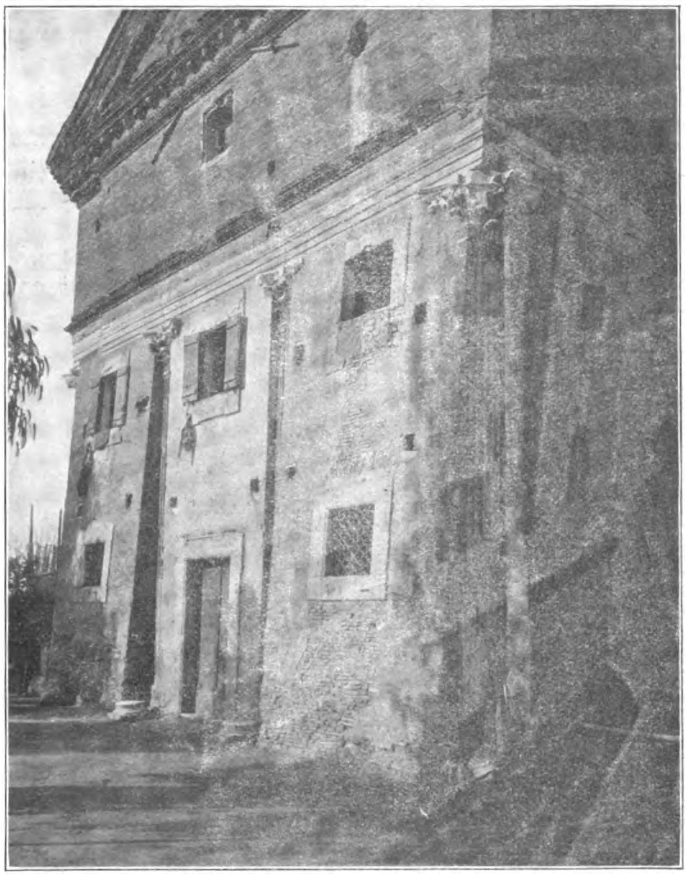
MIDDLE

finement of this tomb is especially noticeable in the four Corinthian capitals, three of which are in perfect preservation. They are left in the simple, big leaf forms, as are those of the third tomb in the Via Latina and they are treated with so much delicacy of feeling and refinement that today they stand as the finest example of brick capitals in any of the tombs.

The color arrangement is peculiar to this tomb. It is all yellow brick excepting the frieze and the pilasters, which even have yellow capitals and bases; the basement however is red. The only tomb that deserves consideration more than this is the so-called temple of Deus Rediculus which is the best example of the style.

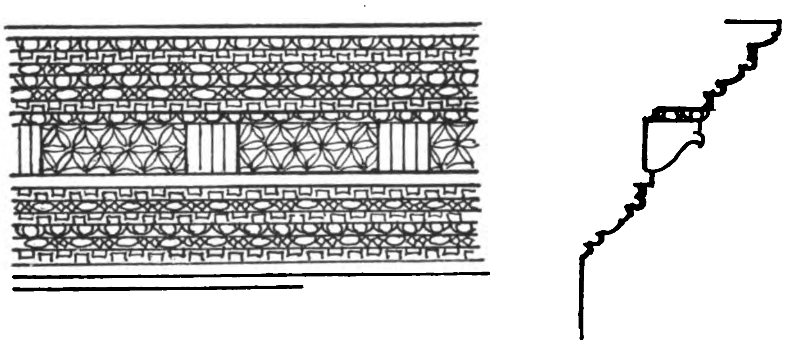
But before considering it, let us look at its neighbor, the little church of St. Urbano which sets picturesquely in a group of trees on a hill top near the Sacra Bosca. It is one of the old Roman tombs and is now used as a church. This structure is so unlike the others that at first it would seem to have no relation to them. The brick detail and profiles have a quaint character and there is a portico (now walled up) of fine antique Corinthian columns of marble such as might have been used in some of the stone tombs on the Via Appia but not occurring elsewhere in those of brick. The only thing that concerns us about it is that in general form it is like the other tombs and built of brick of the same make although a little thicker and laid in an irregular fashion.

Since capitals and columns are of marble, the only detail left in brick for our consideration is that of the main cornice and it is detail showing none of the classic forms and none of the refinement which characterizes all the other tombs. As the drawing shows, the cornice is put together without clearly understood design and the only thing that gives it any character at all is its modillions. Each brick course in itself is a perfectly good moulding but they are laid upon each other with so little regard for resulting profile that the effect is most peculiar. It seems as if bricks which had been cut into various shaped mouldings, an egg and dart, pearl moulding, dentils, etc., had been made into a cornice by workmen who had absolutely no knowledge of cornice design. This is the only explanation that seems plausible for such a mixture and redundancy of mouldings as in this profile.

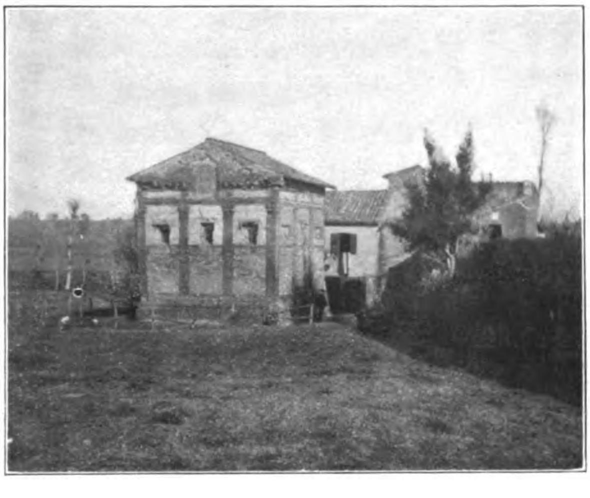


TOMB, NOW CHURCH OF SAN URBANO ALLA CAFFARELLA
CALLED "TEMPLE OF BACCHUS"

In the valley beneath St. Urbano and the Sacra Bosca runs the little river Almo through the fine tract of land owned in ancient times by Herodes Atticus and Annia Regilla. Herodes was born at Marathon, A.D. 104, one of the wealthiest Greeks of the time, and he married the distinguished Roman lady Annia Regilla whose wealth exceeded even his own. Unfortunately Annia died at an early age, whereupon her husband, losing his social position in Rome, was suspected and even accused of her murder. In his intense grief he paid all kinds of tribute to his wife and endeavored to satisfy the mind of the public and to regain his social standing by raising numerous monuments to her memory on their land between the Via Appia and the river Almo. The principal of those which remain is the tomb popularly called the "temple of Deus Rediculus" (God of Retreat). The name is derived from an old tradition which marks the spot as the one where Hannibal turned back before the gates of Rome, in commemoration of which event the Romans caused the temple to be raised to the God of Retreat. No inscription has ever been found to give definite information on this point but the building has not the complete form of a temple and as we have seen is similar in character to the brick tombs on the Via Latina. It is far more probable therefore that this structure was erected as the family tomb of Herodes, Regilla and their children.



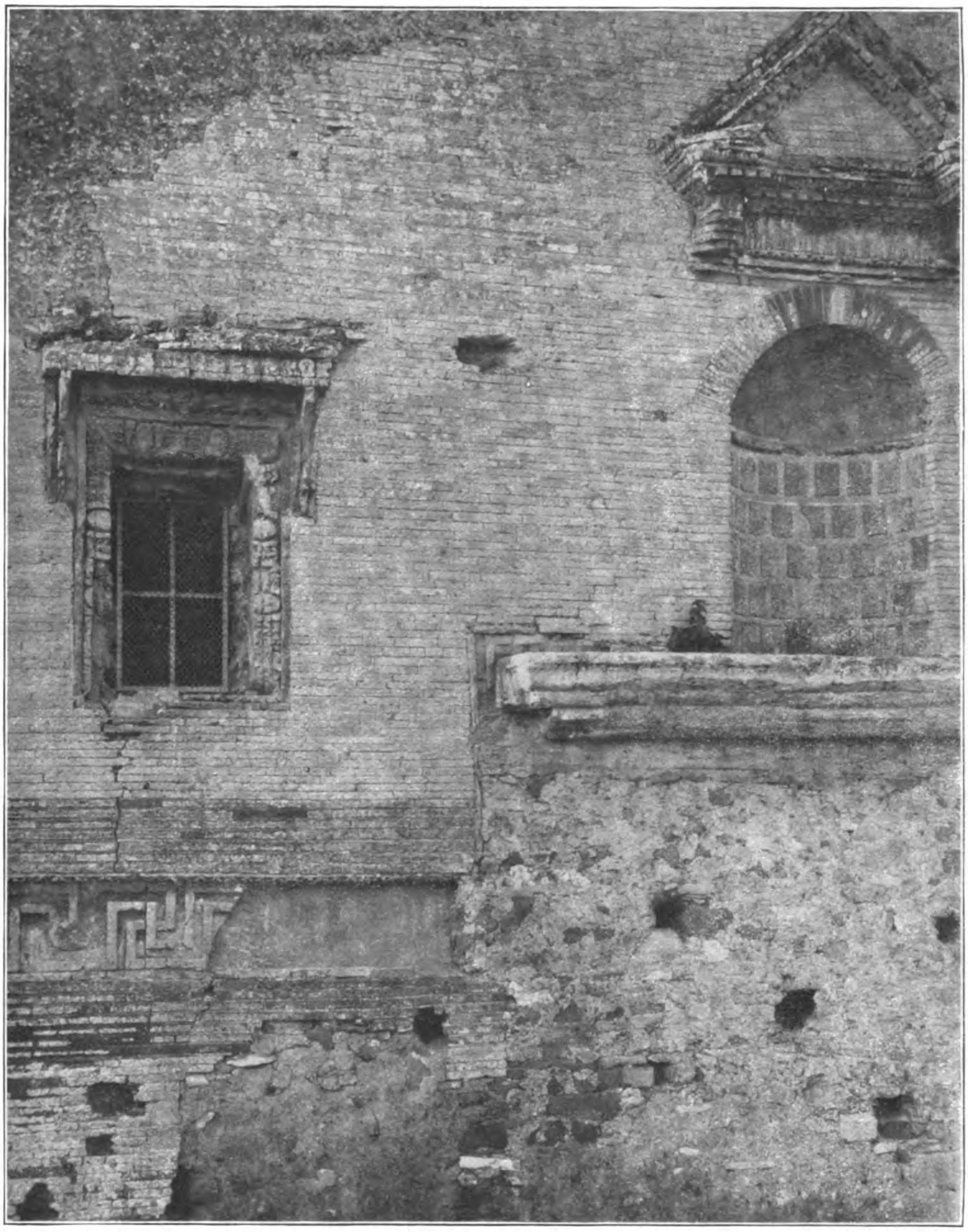
CORNICE OF ST URBANO
IN BRICK
Scale 1ft.
MEASURED & DRAWN BY L.P. BURNHAM.



"TEMPLE OF DEUS REDICULUS"

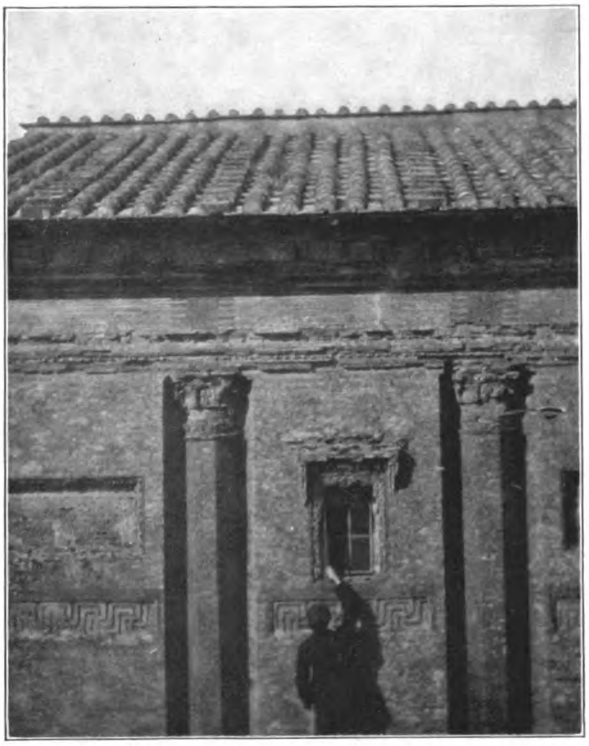
This tomb is not only the finest example of its style but today, fortunately, it is the best preserved.

It is a simple temple-form structure, in plan about square, with three bays on each side and is raised on a stylobate which projects in front to form a terrace. This terrace probably had a broad flight of steps leading up to it and to what was either the principle entrance or else a large memorial tablet. It seems most likely that it was the entrance for there is no other entrance except a small side door in the basement. Above this front entrance is a charming little semicircular niche of quaint design with a pediment over it. The way this niche is treated shows what beautiful effects can be obtained by the use of brick and terra-cotta. Here square red brick tiles of a dimension equal to four brick courses are used with always one horizontal yellow brick course separating them and a single yellow brick separating the tiles of each course. The contrast of the red tile squares divided by the yellow line of the brick makes a most delightful play of color; furthermore the crisp rich carving of the pediment mouldings make this a most individual little feature such



WINDOW AND NICHE, "TEMPLE OF DEUS REDICULUS" as is found in no other tomb. In fact the semicircular arch of this niche is the only arch found in any of the tombs under consideration.

The mouldings of the window enframements have even more charming treatment than those of the pediment. The key-note of the charm these windows have is that they are small in relation to the wall space and have a fine broad decorative enframement which is nearly one-half the width of the window opening. This enframement consists of six brick courses carved in an interesting design of egg and—not dart, but an interesting little leaf design best seen in the restored detail, which also shows that every part of the window is decorated, including the window cap and its consoles. The window being small and of deep reveal it has a broad shadow which makes the opening tell as a very dark spot, which, enclosed by the vigorous carving of its enframement, makes a concentration of interest in admirable contrast to the plain brick wall. The most individual feature of this tomb is on its east side; here something is done which occurs in no other tomb and I think in no other antique architecture. Here, as the photograph and the drawing show, there are semicircular niches with half octagonal columns engaged in them, the face of the column being flush with the surface of the wall. In the central one of the three bays of this wall is a window such as already has been described and in each of the side bays is a little panel with a carved moulding about it. The original finish of the panel is gone but it probably contained an inscription concerning the family to whom the tomb was erected; or it might even have been a decorative panel as is found on the tomb on the Via Appia Nuova. An excellent Greek fret in yellow terra-cotta slabs runs entirely around the building serving as a sort of sill course for the windows. The entablature of this tomb is one of the finest of the type already described in the Via Latina. Especially as regards color arrangement it excels the others.



DETAIL OF SIDE
"TEMPLE OF DEUS REDICULUS"

The perfect proportions of this tomb together with its refinement and richness of detail and color make it a monument worthy the closest study. It was keenly appreciated by the architects of the Renaissance who are said to have studied it eagerly.

The interior of the tombs not being finished in brick would not come under the title of this essay, but it is such a masterly treatment that it can not pass without a mention. It is a beautiful colored treatment of modelled stucco in geometrical panels each containing a raised design which is painted. These designs are executed in a delightfully sketchy manner with much spirit and charming effect, depicting mythological subjects. In one of the tombs on the Via Latina we find in practically perfect preservation scenes from the Trojan War such as the Judgement of Paris, Achilles and Thetis, Achilles in the Isle of Scyros, etc.

The dates of the different tombs can be told in a general way by comparison with those of the Via Latina of which the date is known fairly definitely. It is known by the stamp on the bricks. The trade-mark of the factory in which they were made is stamped on each brick. This stamp has the names of the two consuls, PLAVTIVS QVINTILLVS and STATIVS PRISCVS who were the consuls in the year of our Lord 159.

THE SAINTE CHAPELLE
ITS HISTORY AND ITS ARCHITECTURE

FELLOWSHIP THESIS BY

MAURICE FEATHER, S.M. IN ARCH. '08

ROBINSON TRAVELLING FELLOW IN ARCHITECTURE 1910–1912

WHEN in 1238 came the news that the crown of thorns was a forfeited pledge at Venice for an unpaid loan advanced by some Venetian merchants to the Emperor Baldwin of Constantinople, Louis IX of France, that pious if somewhat bigoted monarch, bestirred himself. With a huge sum of money—by a subtle irony raised largely from the Jews—the debt was paid, the pledge redeemed, and Christendom's most revered relic brought in triumph to France. If so minded one can read in the old chronicles how the king met his envoys at Sens and, barefooted, himself carried the sacred treasure enclosed in three caskets respectively of wood, silver and gold. The procession took eight days to reach Paris where, after being exposed on a platform outside the walls to the gaze of the multitude, the relics were transferred to Notre Dame and finally to the Palace Chapel of St. Nicholas.

When, the following year, the Emperor Baldwin was constrained to part with other relics it was Louis who acquired them and their value and sanctity convinced him of the necessity of enshrining them suitably: for which purpose the chapel of St. Nicholas was demolished and the present Sainte Chapelle begun under the direction, it has always until recently been conceded, of Pierre de Montereau. But recent investigations if not entirely disproving that assertion, have at least thrown serious doubt upon it. For the Chapel of St. Germain-des-Prés in which Pierre de Montereau lay buried with his wife Agnes until Revolutionary times, is unquestionably his own creation. But in its construction and details, one discerns much more of the style of Champagne than of the Ile-de-France, a characteristic shared by two other authentic examples of Pierre de Montereau's work:—namely the chapel of the Château of St. Germain-en-Laye and certain portions of the Abbey Church of St. Denis. Whence it is but a reasonable inference that the Sainte Chapelle is by another hand.

But if the authorship is in doubt, the character of the fabric itself would fix its date with tolerable certainty were there any lack of documentary evidence. Built at a time when architecture was developing rapidly, the profiles of the mouldings betray its date, as the perfect unity of the whole necessarily limits the duration of its construction. Begun in 1245 it was finished in the remarkably short time of three years, and cost forty thousand *livres tournois.*

The solemn consecration took place the twenty-fifth of April 1248—the upper chapel dedicated to the relics, the lower to the Virgin—with great pomp and ceremony and the usual liberal accordance of indulgences.

Subsequently for three centuries scarce an important event occurred to the reigning family which had not this royal oratory for its stage. Here St. Louis was canonized, here Dauphins were christened, married, consecrated, crowned. And from the chapel as kings they were buried. Here was conduct regulated with reference to the great Papal Schism. Hither many foreign potentates made pilgrimage, notably Henry III of England; and again when Charles V of France, the Holy Roman Emperor Charles IV, and his son Wenceslaus king of the Romans came in the rôle of the Three Holy Kings to venerate the relics.

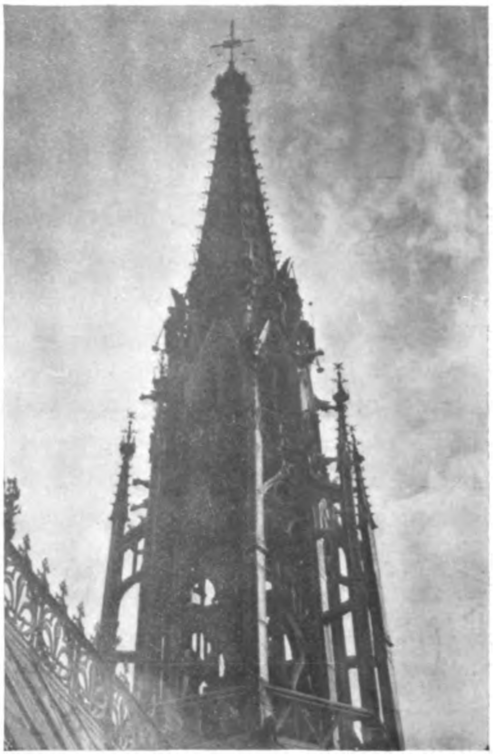
But it is rather with the architectural aspect of the Chapel that we are chiefly concerned.

After its consecration in 1245 it underwent no repair or change for a considerable time. There is a record of interior decorations and other minor repairs under Philip IV in 1299. In 1349 a sum of money was dedicated for the addition of a clock; 1354 and the following years saw the lead roof repaired. But not until the advent of Charles VII's reign was any material change in the outward aspect made. Under that monarch much needed restorations radically altered its appearance. The rose window was rebuilt and crowned with its decorative parapet, the top of the turrets of the west façade were re-built according to a more elaborate design and the boldly projecting crockets of the main gable were added at this time. Louis XI, more seclusive than his predecessors, made his contribution to the Chapel in the form of a private oratory suspended over an arch between the buttresses of the fourth bay on the south side, and also for the first time added a cresting to the roof ridge. During the following reigns further changes appear. Charles VIII completely renovated the building without materially altering its aspect. Louis XII, grossly fat, did not inhabit the Palace and as the turret stairs leading to the upper chapel were two confined to admit the passage of his corpulency, he began the construction on the south side of the chapel of an outside stairway of easy grade up to the porch, a sort of inclined plane up which his avoirdupois might comfortably be carried in a litter. This staircase was destroyed by the fire of 1630, but was afterwards rebuilt and not finally done away with until the nineteenth century restoration.

PINNACLE OF THE FIFTEENTH CENTURY

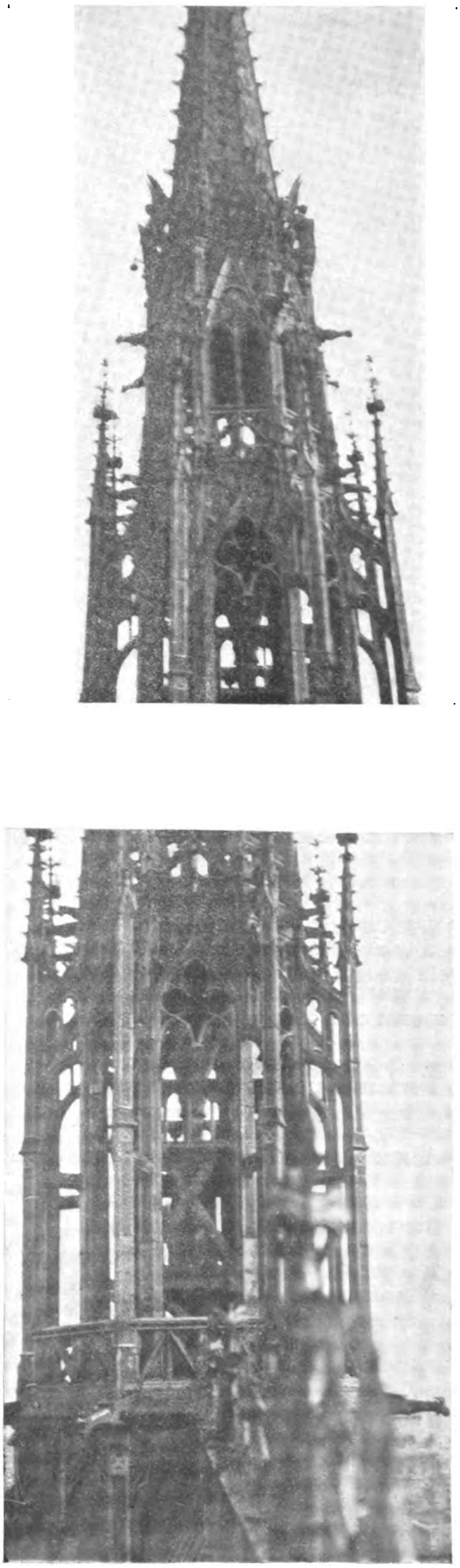
After escaping the Palace fire of 1618 the Chapel narrowly escaped total destruction from the same cause in 1630. On July twenty-sixth of that year the roof took fire owing, it is said, to the carelessness of the lead workers engaged in repairing the roof. The canons sought aid from the governor of Paris but before the fire could be checked the *flèche* and roof were totally consumed, great damage being done to the walls, glass and surrounding buildings from the molten lead which poured from the roof in great volume. When the fire was at its height fear was even entertained for the stability of the vaults, so much so that the relics were carried out and placed in the treasury which was walled up for their safe keeping. In 1634 the reconstruction was undertaken by Louis XIII and continued in desultory fashion for nearly half a century. The *flèche* was not actually finished before 1671. And almost immediately the Chapel suffered anew—this time from the famous flood of 1689-90—necessitating considerable restoration especially in the lower church.

But it is perhaps the *flèche* more than any other part which has suffered the most frequent tampering and rebuilding.


THE FLÈCHE

There is nothing to show that the Sainte Chapelle of Louis IX ever received this decorative feature though one cannot doubt that such an indispensable element was intended. Constructed in one of the subsequent reigns the first erection soon perished to be replaced under Charles VI by a wonderful creation extolled as one of the wonders of Paris, only to fall a victim to the fire of 1630. The third, finished as we have seen in 1671 under Louis XIII, while inferior to its predecessor was nevertheless an ambitious attempt, as is seen from many old prints. It bore four bells, blessed in 1738 and christened with proper ceremony in honor of members of the royal family of Louis XV as Canon Moraud tells us in his quaintly written account of the proceedings. He also naively adds that the *flèche* leaned a little, "not from design but from faults in the construction." Just prior to the Revolution the Sainte Chapelle had its narrowest escape from total destruction or at least from such weird disfigurment as would make absolute destruction preferable. There germinated in the mind of Couture, an architect of the king's domains, a scheme which for utter absurdity surpasses belief. This inspired idiot consented to respect the pointed form of the windows (doubtless from necessity) but all the glorious stained glass was to disappear to be replaced by transparent glass of rectangular form held in place by six superposed transoms, the arch to be filled with scroll work. As a final touch of genius, for the charming thirteenth and fourteenth century detail he would have substituted, wherever possible without injuring the stability of the structure, balustrades, pilasters and all the adventitious Renaissance machinery of which an undiscriminating mind could conceive. That this awful atrocity was never carried out is probably due not so much to the good taste of the times as to the lack of funds.

But evil days are come for the church in France. The chapel escaped mutilation in 1783 only to incur the same fate ten years later. In 1792 came the Convention's order which stripped the churches of Paris of their sacred vessels. The priceless gold relic-casket of the Sainte Chapelle with such of its jewels as had escaped the depredations of Henry III and subsequent impecunious royal highwaymen went to feed the hungry war-chest of the Revolutionary armies. Nor did the building itself fare much better. The roof was stripped of its lead covering and recovered with a much thinner layer, doubtless to the financial advantage of some favored contractor. As was also to be expected, the fleurs-de-lys on the *flèche*—"disgraceful symbols of tyranny and oppression"—roused the ire of the worthy citizens of Paris bent on removing every last vestige of the monarchy. But here a difficulty arose; to remove the hated insignia required a scaffolding, a scaffolding required money and money was not a commodity with which France's mob-rulers of that time were any too well supplied. So recourse was had to the brilliant expedient of removing the whole *flèche*, the materials contained therein to be the recompense for the removal of the offending emblems. This was done forthwith, the gaping hole in the roof being temporarily patched with lead. So we have the spectacle of a decorative member, an adornment to any city, removed not from any failure in its construction or



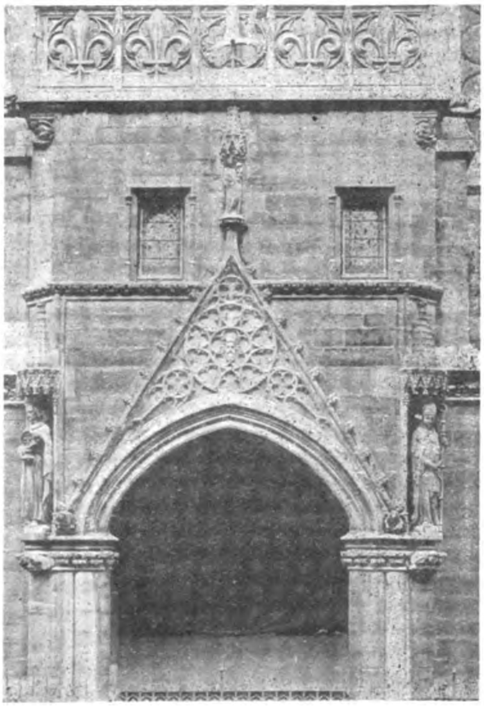
DETAIL OF FLÈCHE

fault in its design, but because it bore the royal lilies instead of the tri-color. To quote Victor Hugo's sardonic comment on a like mutilation of Notre Dame, "An architect of good taste (?) amputated it and considered it sufficient to cover the wound with a leaden plaster which resembled the cover of a pot." Nor was the spirit of wanton destruction less fruitful on the body of the building,—advanced ideas of iconography in 1793 admitted of very little which could recall the late rulers. So the statuary emerged from the chastening chisel shorn of any and all reminders of the late unlamented monarchy.

After the Revolutionary iconoclasts had done their worst, the Sainte Chapelle, no longer used for religious purposes, was allowed to fall into disrepair. In 1803 the chapel which was St. Louis' pride was used as a store house for flour-barrels and it was not until some years later that it became a repository for judiciary archives. Even this important function did not prevent its total neglect and gradual dilapidation; little by little its glass was broken, its carvings chipped and destroyed. But the year 1836 saw the end of its neglect. In that year Lassus, contemporary and friend of Viollet-le-Duc, thoroughly imbued with appreciation and love for the Gothic movement, displayed at the Salon a series of drawings of the Sainte Chapelle which immediately awakened public interest in a building which as everyone now realizes represents a psychological moment in the development of the world's most logical building impulse. General interest once aroused, the rest was easy in the reign of Louis Phillippe whose mania for restoration (not always happily directed) is too well known to need comment. A commission, of which Lassus was one, was appointed in 1837. Ample funds were promptly forthcoming and so began that systematic, thoughtful restoration which when completed in 1865 restored to us this gem of thirteenth century art as nearly in its pristine condition as modern research and modern hands could compass. The building now enjoys a tranquil old age under the paternal care of the Bureau des Monuments Historiques with every prospect of having weathered its last political storm and undergone its last mutilation or neglect.

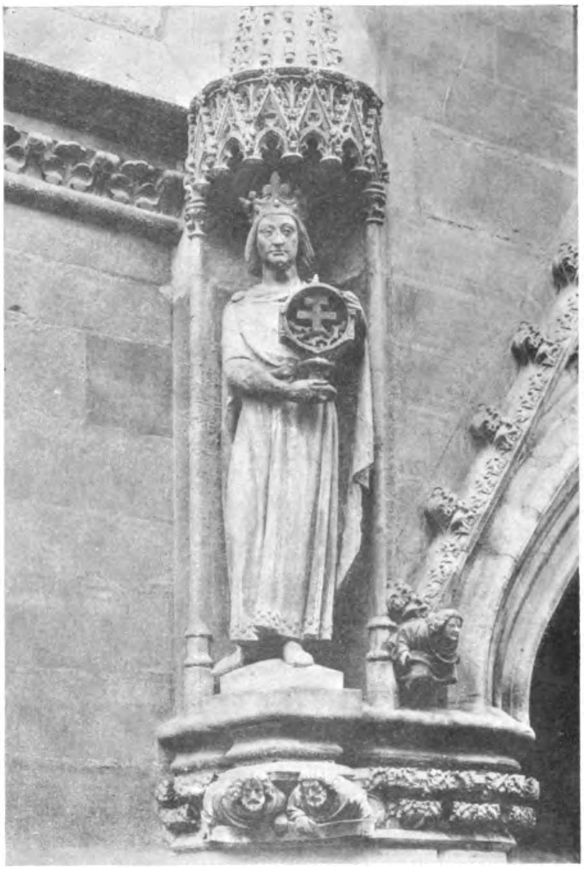
THE unique disposition of the Sainte Chapelle—that of two chapels one superimposed on the other—is explained by the usage to which it was destined. A necessary adjunct to a royal residence, the chapels on two levels permit the royal family to reach their private oratory without the medium of stairs, while the lower chapel, on a level with the *rez-de-chaussée* of the Palace was intended for the king's attendants and servitors.

Normally orientated the Chapel deserves notice first of all for the interesting setting out of its eastern termination. The first bay of the apse is merely a continuation of the side walls of the nave, though the eastern buttress of this bay like all its fellows in the apse radiates from a point half a bay to the east of the first bay of the nave proper. This disposition, the solution resorted to at Amiens, gives preeminently the maximum of ease in what is, in almost any other solution, an awkward transition from the narrow apsidal subdivision to the major bays of the nave. In the present instance, this impression of subtle facility is heightened by the absence of any feature—such as for instance the unfortunate turret at Vincennes—to emphasize the point of departure of the apse. And great homogeneity in the east and side elevations is obtained in spite of the disparity in width of buttress by the similarity of treatment of these important members. Their division by drip-moulds into eight nearly equal horizontal zones gives a decorative effect, simple but happy. At their summit the buttresses terminate in pinnacles, square at the base, then tapering to a point and finial by a more or less complicated use of gables and pyramids. The fenestration shows Gothic construction carried to its logical issue if not somewhat beyond, for the windows with their early bar tracery completely fill the space between the buttresses. Over each archivolt, decorated with alternating leaves and crockets widely spaced, a gable with crocketed ramps terminating in a finial rises considerably above the parapet, a happy interruption of the horizontal line of the parapet which would otherwise be too insistent. Just below the ramps, two small gargoyles drain the awkward angle between gable and buttress. Suspended between the buttresses of the fourth bay on the south side is Louis XI's private oratory—a small box-like compartment carried on an arch with richly traceried gable terminating in a minute niche. To either side of this gable and niche are small windows unsymmetrically placed while the whole construction is crowned by a delicate parapet of five panels of quatrefoils, four enclosing fleurs-de-lys, the fifth, the central one, bearing a richly carved "L," the initial of its royal builder. All the detail on this little oratory, the window jambs, niche canopies, gable and mouldings and statuary, is of the most delicate execution imaginable.



ORATORY OF LOUIS XI

But it is the west façade which deserves the major amount of interest and study, not only from its mixture of periods, but from the subtlety of its proportions and the excellence of its composition. It is framed by angle turrets, and clearly divided by strong horizontal bands into three stories, the lower comprising the porch, the second the rose window, well defined with its balustrade, and finally the gable piercing the third horizontal line which connects it with the angle turrets. The heights of these stories are in a rhythmical progression, a progression proportionately repeated in the projection of these several stories from the plane of the gable. This recession is a vital element in the perspective composition partially suppressing the extra prominency which the gable, if on the same plane as the rose window, would necessarily have. Examined more in detail this façade offers other interesting variations. The porch itself, extending in a very unusual manner across the entire façade, is in addition an excellent sample of Gothic flexibility. In each of its two stories are five arches of three

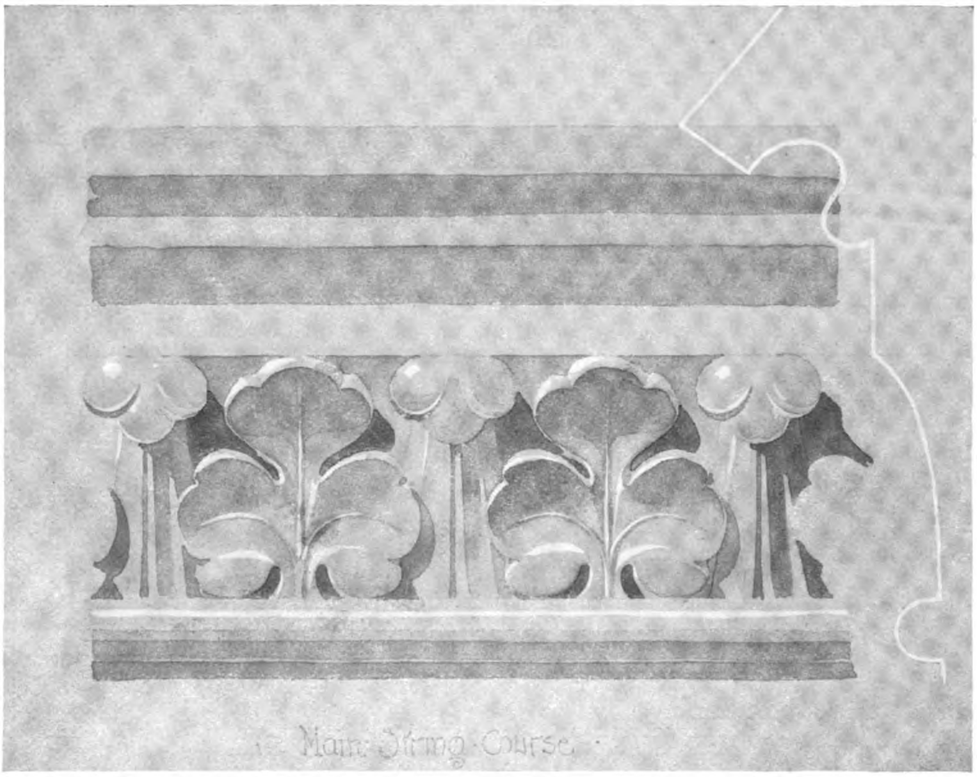


STATUE OF ST. LOUIS
EXTERIOR OF ORATORY OF LOUIS XI

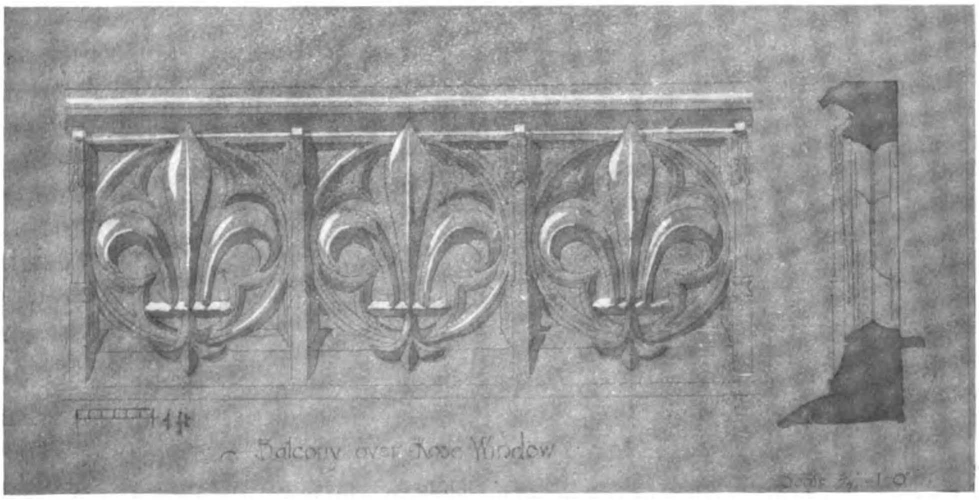
distinct types springing from three different heights, sharp lancets rubbing elbows with broad two-centered arches without even a common spring. And yet this seeming chaos of unrelated elements forms in reality a gracious, harmonious design, a subtle blend of grace and vigor. The second story, comprising the beautiful rose window with its parapet above, is pretty fully developed. Flamboyant, yet its exuberant flame-like ramifications are not amiss even when contrasted with the restrained severity of the thirteenth century porch and gable. The circular form is emphasized by a delicately moulded archivolt filled with decoration of a somewhat fretful character. Above is a broad cornice consisting of several shallow hollows, the topmost of which is filled with rather over-delicate ornament below the rich parapet of fleurs-de-lys enclosed in quatrefoils. Projecting above the center of this parapet and supported on either side by kneeling angels is a richly carved letter "K," the initial of the name Karolus recalling Charles VII in whose reign this part of the building received its final form.

The main gable after cutting through the delicate open arcade which connects it with the turrets is ornamented with boldly projecting crockets terminating at the peak in an elaborate finial. A small rose window surrounded with three shallow quatre-foil panels, lights the space in the roof above the vault. To either side of the gable rise the wonderfully decorative turrets, entirely of Charles VII's time, above the top of the parapet. Above a blank arcade with pedestals for statues, which one is happy to find absent, a rich cresting of lilies terminates the turret proper, while a tall tapering pinnacle enriched with crockets and encircled with a carved crown of thorns forms the final stage. While much of the fifteenth century detail with which they are adorned can be severely criticized one cannot but admire the suave contours of these most graceful of turrets.

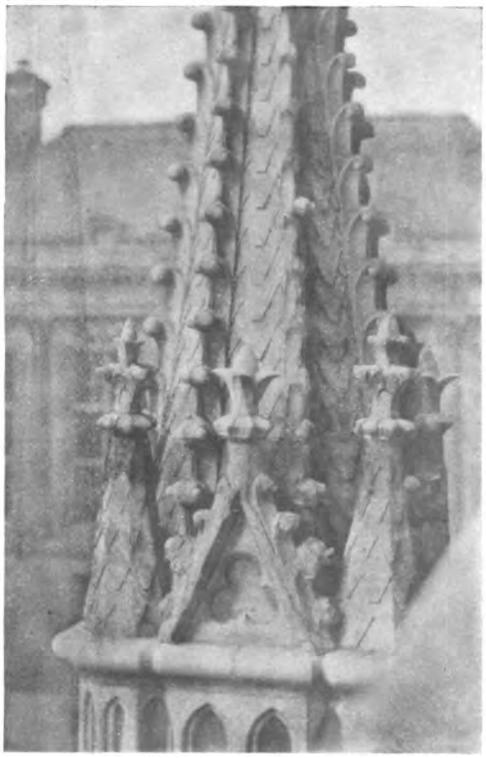
The detail of which there is an abundance forms not the least interesting feature of this interesting building. Such select examples of the work of different periods are not commonly found assembled so conveniently for comparison. The detail as we have seen is characteristic of three periods—the first half of the thirteenth century and examples of two stages of development in the fifteenth.



DETAIL OF MAIN STRING COURSE

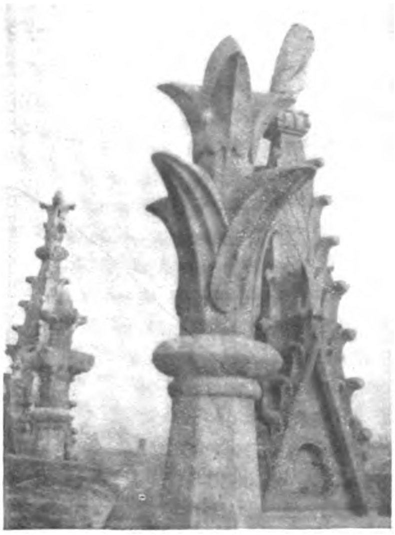


BALCONY OVER ROSE WINDOW



PINNACLE OF THE THIRTEENTH CENTURY

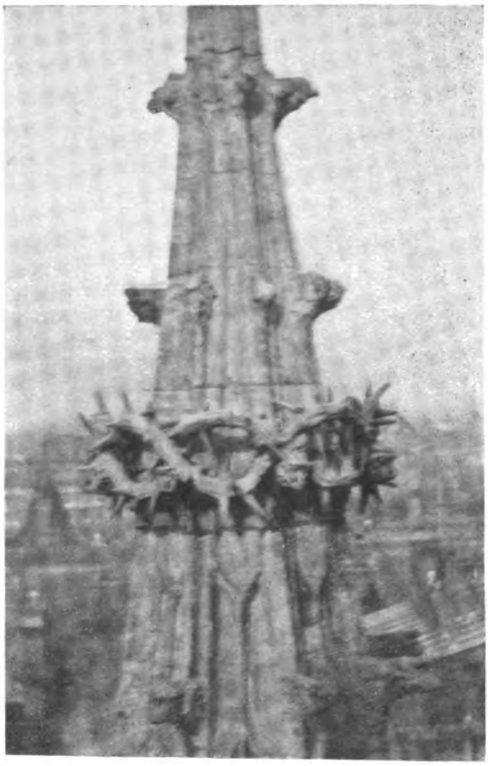
The early work is characterized by freshness, vigor and breadth. Prior to the middle of the thirteenth century preoccupation with structural problems had prevented any over-emphasis of detail. And the present example is of exceptional value in this connection since it shows Gothic art at its apogee, when the principles which govern Gothic construction had first come rightly to be understood and scientifically applied and before complete mastery of construction had diverted the genius of the movement to expend itself on elaboration and detail. To consider a concrete example: the main string course of the building, an imperfect drawing of which is appended, consists of closely spaced crockets alternating with leafage similar in character to the English waterleaf foliage carved with a nice feeling for scale and proper attention to breadth. Nor does this breadth necessarily augur any lack of delicacy of execution: each leaf and frond has its midrib conventionalized for simplicity's sake but none the less faithfully rendered. But here it is necessary to note that, though there is increased feeling for breadth as one rises further from the ground, the size does not necessarily increase. The leaf fronds in the porch cornice are not much if any larger than in the string course below, but are subtly different in character, the planes are more simply kept, the spacing is wider, giving much simpler light and shade. The same principles govern the design of the main cornice, an effective combination of simple leafage and boldly projecting crockets impossible unfortunately to photograph in detail.



FINIALS

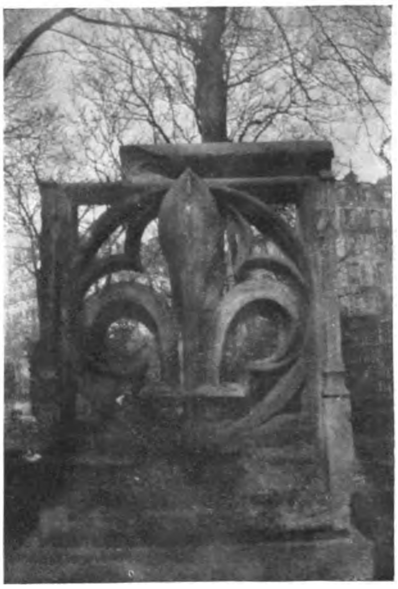
The same vigorous character permeates the other detail; it would be difficult to conceive of a more satisfactory termination to the buttresses than the pinnacles shown in the accompanying photographs—a pyramid square in the plan covered with a simple species of scale ornament, crowned with a finial and flanked by gables crocketed with vigorously projecting knobs.

Similar in character and equal in merit are the sturdy pinnacles that crown the buttresses of the porch. In fact there is nothing here which does not triumphantly fulfill the final test of all detail, namely that it should have its maximum of effect from its most usual vantage point, in this case the ground. This principle is exemplified in the charming parapet twice repeated in the design of the porch. Designed for close vision, nothing can exceed the delicacy of its coupled sculptured capitals (all different) or its band of finely chiselled rosettes.

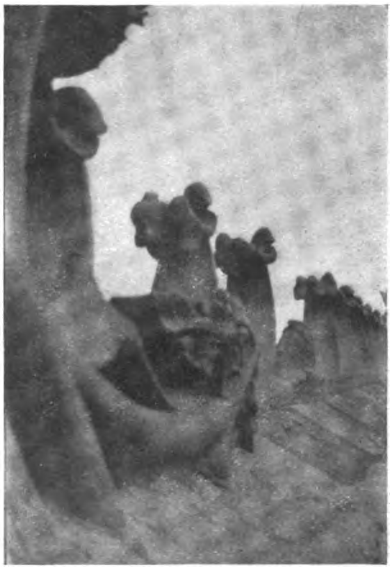


DETAIL OF PINNACLE WITH CROWN OF THORNS

But an examination of the detail of Charles VII's time reveals a great change. While much of the work clearly betrays its ancestry in the detail of two centuries before, for the most part we have a new system of ornamentation, a new detail more abundant, more sumptuous, more vivid, but without the virility and breadth of what had preceded it. In other words this early fifteenth century Gothic work shows unmistakable signs of that decline which finally smothered the style in ornament. Notre Dame showed the thirteenth century constructor what he could do, Beauvais what he could not, and this definition of the scope of his structural capacity diverted his genius after 1300 to the development of a richer rather than a more logically perfect style.



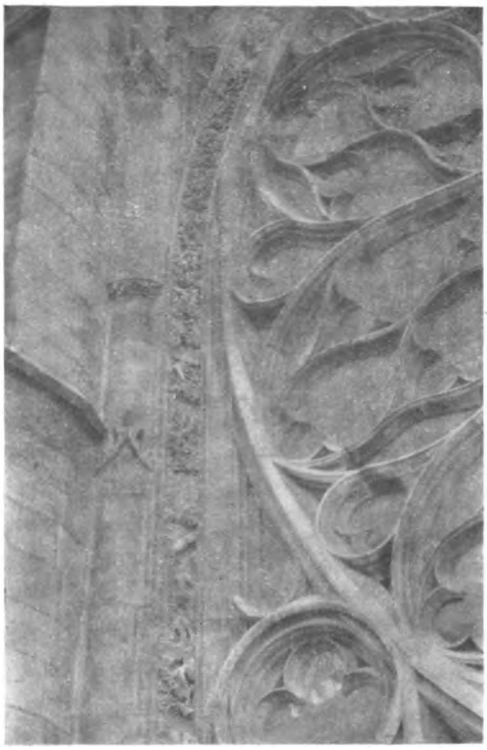
FRAGMENT OF PARAPET OVER THE ROSE WINDOW



CROCKETS OF MAIN GABLES

But if this abasement is all too prevalent there are extenuating exceptions. The fine parapet of fleurs-de-lys enclosed in quatrefoils above the rose window shows its affiliation with earlier work in its broad modelling and decorative feeling. Likewise the simple effective crockets and finial which decorate the ramps of the main gable, inevitably suggest restoration from older work rather than the redesigning usually resorted to in Charles VII's time.

But the presence of the decline is none the less evident, nowhere more pungently than in the carved cornice and the archivolt of the rose window. One could not well desire a more telling contrast than the juxtaposition of the thirteenth and fifteenth century cornices afforded by the west façade. On the one hand we have the thirteenth century at its best in boldly projecting crockets and simple leafage, on the other an irritable band of foliage in the execution of which the carver could not stay his hand: on the one hand broad spacing and simple light and shade, on the other fussy elaboration; the one bold, effective; the other mincing, fretful.



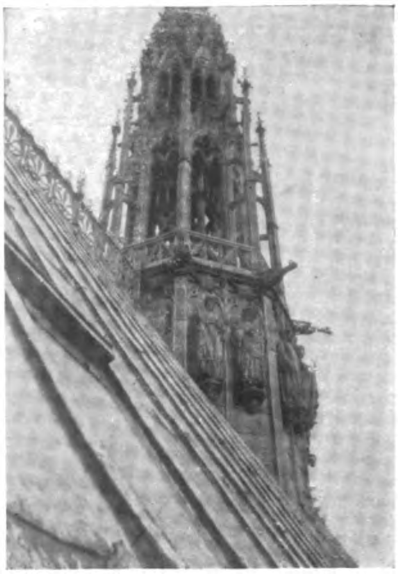
DETAIL OF ROSE WINDOW

On the score of detail even the great rose window borders perilously on the ineffectual; its mullion section is frittered away in shallow hollows and delicate arrises which would result in insipidity were it not for the generous reveal of the glass. Nor are the turrets, though so satisfactory in the mass, entirely exempt from a like criticism. The cresting of lilies is beyond praise, but some of the detail would be quite proper to a choir stall in wood, so far had its design become individual at the expense of subordination to a general scheme.

DOORWAY AT BASE OF ROSE WINDOW

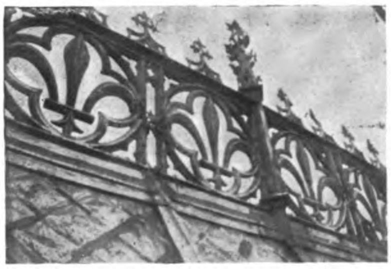
The work of Louis XI, but little removed chronologically from that of Charles VII, differs still less in general character. It emphasized the defects of that work while enhancing its charm. For one must confess that there is a delicacy of execution, a captivating vividness of fancy about this late Gothic carving that almost excuses the treatment of detail as an end in itself rather than a means to an end. And when as in the present case the offending ornament is confined to a small area near the eye—an incident in a façade—condemnation is especially difficult. A glance at the illustrations will explain one's natural indecision between admiration of minute, skillful handiwork and condemnation of carving too fine for the material and ineffectual in its position.

No consideration of the exterior is complete without some mention of the *flèche*. It was Lassus who created the present beautiful structure, in which he sought to reproduce the one in existence before the fire of 1630. How well he succeeded is of no moment, as the present *flèche* is satisfactory in every way. Three diminishing octagonal stages support the needle. About the lowest stage, forming a transition to the roof, are grouped the twelve Apostles; the next stage by delicate little flying buttresses carries up the long tapering line which terminates in the needle; while just above the third stage stands a row of angels bearing the instruments of the Passion. The whole design is elegant and harmonious to the last degree. Not the least of its many merits is the restrained but effective use of gilding: the needle is clearly defined and emphasized by its metal crockets and gilded angels terminating in gilded chevrons below the cross, while its tapering sides have small fleurs-de-lys beaten into the metal at intervals and gilded. The angels' wings are daintily picked out in gilt; narrow gold stripes define each arch, buttress, parapet and pinnacle, never in large areas, but by conformation to the lines of the architecture more effective for that very reason.



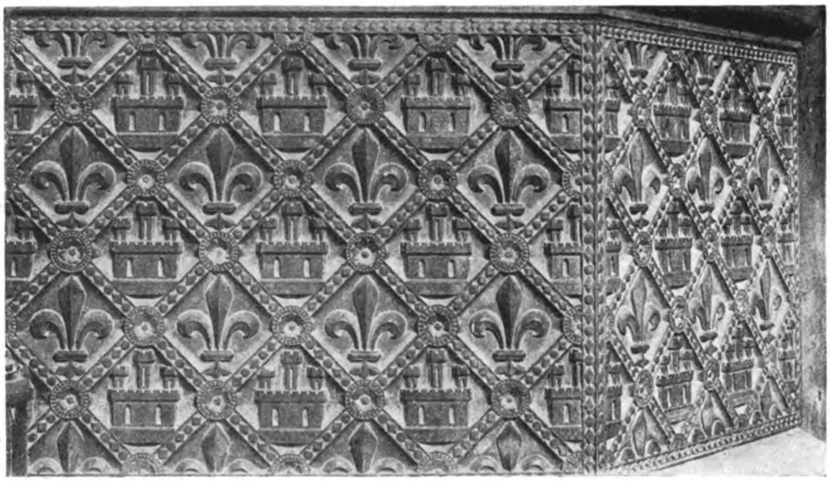
THE FLECHE FROM THE ROOF

The same method is employed in the treatment of the beautiful iron cresting of fleurs-de-lys which traverses the roof ridge from end to end terminating above the apse in a richly gilded pedestal bearing a lead angel. Nothing can exceed the fine breadth, the subtle feeling for material, the modelling of the hair, drapery and wings of this most beautiful figure designed in soft material: usually strengthened with an armature, there is nothing in its simple vertical pose and the small projection of hands and wings, to require such support. With its rich pedestal decorated with masks of kings and saints this statue dominates the whole east end.



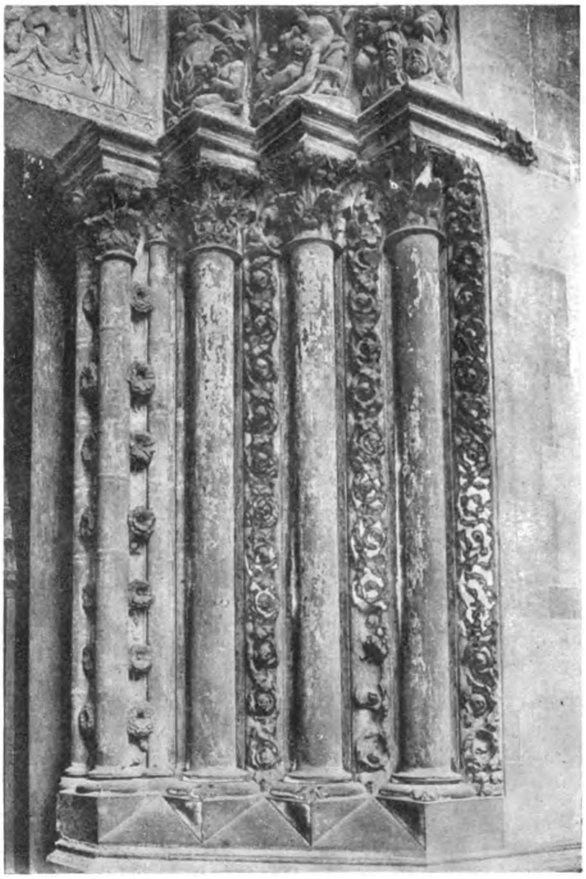
CRESTING OF MAIN ROOF

As we have seen both of the doorways from the porch to the interior of the chapels are of the orthodox French type. But both were badly mangled in Revolutionary times, necessitating such thorough rebuilding that the design of the original sculpture was lost. All that remains of the original carving in the case of the lower door is the dado of lozenges, enclosing alternately the lilies of France and the triple towers of Castile, an allusion to Queen Blanche, the mother of St. Louis. Above this dado four *colonnettes* on each side bear a



DETAIL OF THE ENTRANCE PORCH
INSIGNIA OF ST. LOUIS AND BLANCHE OF CASTILE

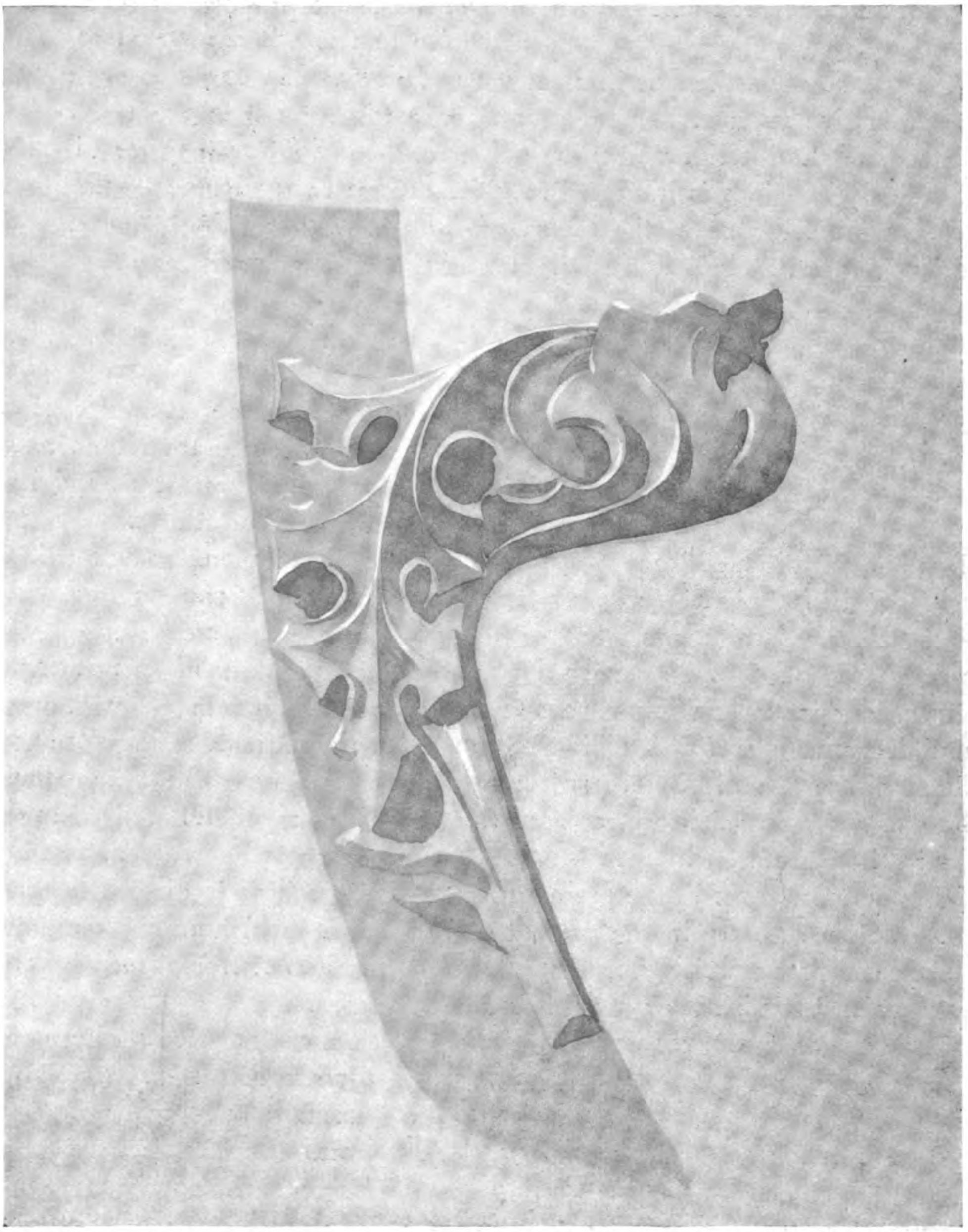
lintel with rather perfunctory leafage with the form but not the spirit of thirteenth century work. The arch mouldings in four orders are somewhat monotonous, while both the Virgin and Child which support the lintel in the middle and the carving in the tympanum representing the coronation of the Virgin are somewhat mediocre.



DETAIL OF THE UPPER PORCH IN THE LOGGIA

Identical in disposition but larger and more pretentious is the entrance to the upper chapel. In this case bas-reliefs of scriptural subjects enclosed in quatrefoil panels are substituted on the dado for the insignia of the royal family. Between the colonnettes is introduced enrichment in the shape of delicate scrolls of various patterns which form with the capitals the most satisfactory part of this otherwise uninteresting restoration. The beneficent Christ holding a globe which divides the door into two parts, as well as the lintel with its sculptured resurrection and the tympanum with Christ seated in judgment are all somewhat stolid in modelling and obvious in expression.

Through these unsatisfactory portals we enter what our old writer likened unto Paradise. Though the lower chapel in its present state scarce justifies this extravagant simile, nevertheless certain peculiarities in its construction give it great interest and it would unquestionably have great beauty if properly glazed. To shorten the span of its vaults and improve the proportions of the nave (only twenty feet high) the aisled plan was adopted, fourteen slender columns with delicate capitals and octagonal bases effecting this division with the least possible feeling of actual separation. But these narrow side aisles equal in height to the nave would not in themselves properly transmit the thrust of the central vaults to the outside buttresses. To perform this indispensable function the architect ingeniously inserted triangular struts carved from single slabs of stone and pierced with a design: veritable interior flying buttresses. Otherwise the vaults are of the ordinary quadripartite variety with the domed filling



DETAIL OF CROCKET OF FIFTEENTH CENTURY

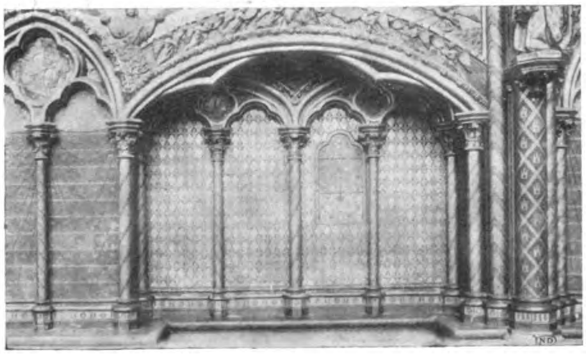
usually to be found in structures of this date. The lighting of this lower chapel is interesting; openings in the form of equilateral triangles with convex sides and filled with geometrical bar tracery entirely take the place of outside wall from the wallribs of the vaults down to a point somewhat above their spring; a solution quite harmonious with the general squat proportions of this lower sanctuary.

As was so often the case in medieval times color plays an important part in the decorative scheme. In the several panels of a blank arcade which makes the tour of the interior under the windows, a conventionalized representation of tapestry hangings is indicated in vivid colors; in the central panel in each bay a symbol of one of the twelve apostles is worked in brilliant pigments, gold and enamel, and framed with a gilt border studded with patterns in colored glass. The columns of this arcade are a deep azure with gilded fleurs-de-lys at intervals; the columns of the nave arcade, together with their responds on the outside walls, are a deep crimson, decorated in like manner with the towers of Blanche of Castile; the vaults are colored the same deep blue studded with gilt fleurs-de-lys, while the ribs are gilded and glazed with their hollows emphasized with vermilion or emerald green.

It is all too customary unthinkingly to heap condemnation upon this system of color decoration, entirely overlooking the fact that its vividness and intensity were qualities rendered necessary by the unparalled brilliance attained by the glass stainer. In the apse, which is the only portion of this lower chapel which is properly glazed, one is conscious of no crudity; there, each area of vivid red, blue or gold is played upon and modified by a mellow light charged with a thousand different hues absorbed in its passage through the richly colored glass. In the nave the effect is far otherwise; there, in the sickly light filtering through the pale *grisaille* which has replaced the original glass, the effect is crude and raw in the extreme.

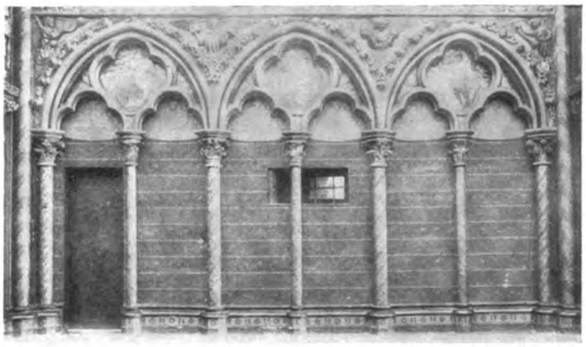
Let us mount one of the narrow turret stairs up which Louis XII could *not* go. At once we are in the presence of an interior which amply justifies the most enthusiastic praise ever bestowed upon it. No visitor to medieval Paris ever omitted to visit it or extoll it in his writings.

This upper chapel consists of but a single aisle vaulted like the lower one. One is first struck by the abnormal development of the fenestration which is here emphasized by the concealment of the exterior portion of the buttresses by the stained glass. The architect, whether Pierre de Montereau or not, knew how to reduce to the minimum his points of support. Unerring was the science which could so oppose thrust to counter-thrust that no deflection would occur in seven hundred years.


ORATORY OF ST. LOUIS

In the third bay from the west sunk in the thickness of the wall beneath the windows are on either side a species of box reserved for the royal family while in the next bay on the south side is Louis XI's little oratory furnished with a squint through which he might venerate the relics unobserved.

In the apse, raised two steps above the nave and flanked by a dainty screen of three trefoiled arches on either side, is the tribune, reached by two delicate little spiral staircases. Part of this tribune is original and one of the staircases also is said to date from the thirteenth century. It may have been trodden by the feet of St. Louis himself as he mounted the tribune to perform his kingly office of displaying the relics. Above this tribune is a baldachin which formerly sheltered the relic casket.

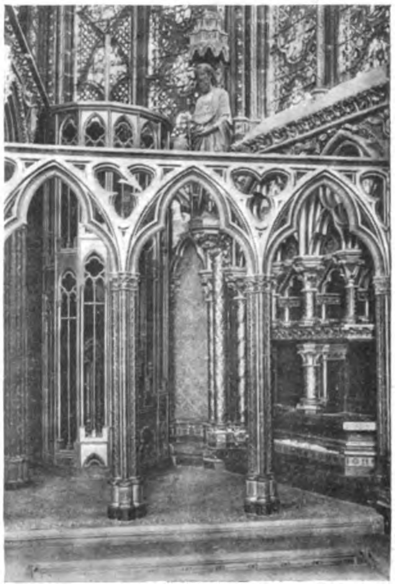


ORATORY OF LOUIS XI

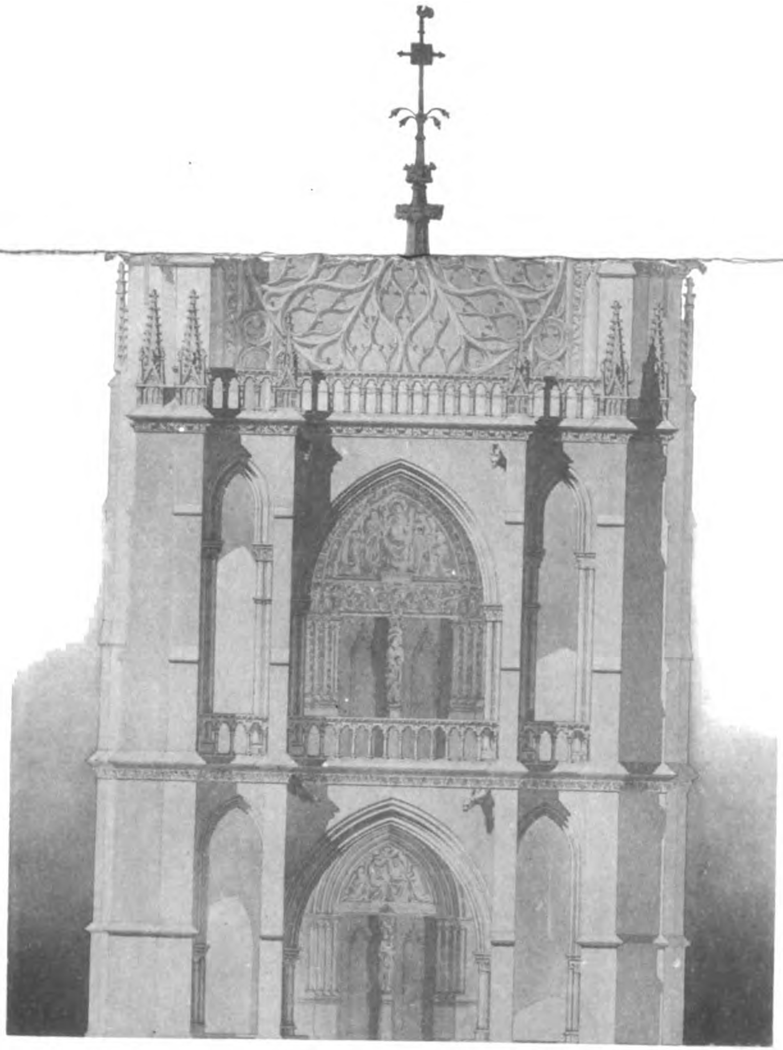
In the color embellishment of these several features the medieval decorator has displayed an almost oriental love of color coupled with good taste and rare discrimination. Paint, gilding, colored glass and enamel elbow each other for place upon this monument to St. Louis' piety yet the effect is never ostentatious, never garish.

This sumptuous color scheme is carried throughout; an arcaded dado richer than the one in the lower chapel fills the space below the windows, delicate painted tendrils climb the vaulting shafts painted alternately blue and red; the vault web between its gilded ribs is painted a deep azure studded with stars.

But perhaps the crowning glory of the Sainte Chapelle is its windows. Admirably restored in 1855 it may justly be said to produce an accurate impression of thirteenth century glass. And those were indeed the palmy days of the glass-stainer; his was the function in the North performed in Italy by the fresco-painter; his was the task, in an age when the man who could read was the exception and not the rule, to picture the Bible from Genesis to Revelation in his church windows, every panel a page of Scripture legible to the mind of the most illiterate. And how thoroughly the early glass-stainer understood his medium! How instinctively he respected its limitations. For he realized that its function was to temper and color, not obscure the light. Working for clear transparency unpreoccupied with the realistic tendencies which led his successors astray, he produced those dazzling symphonies of color—those acres of glorious polychromy the remains of which we worship at Chartres and elsewhere.



HIGH ALTAR



SAINTE CHAPELLE, PARIS

MAURICE FEATHER S. M. IN ARCHITECTURE

ROBINSON TRAVELLING FELLOW

Supplement to the
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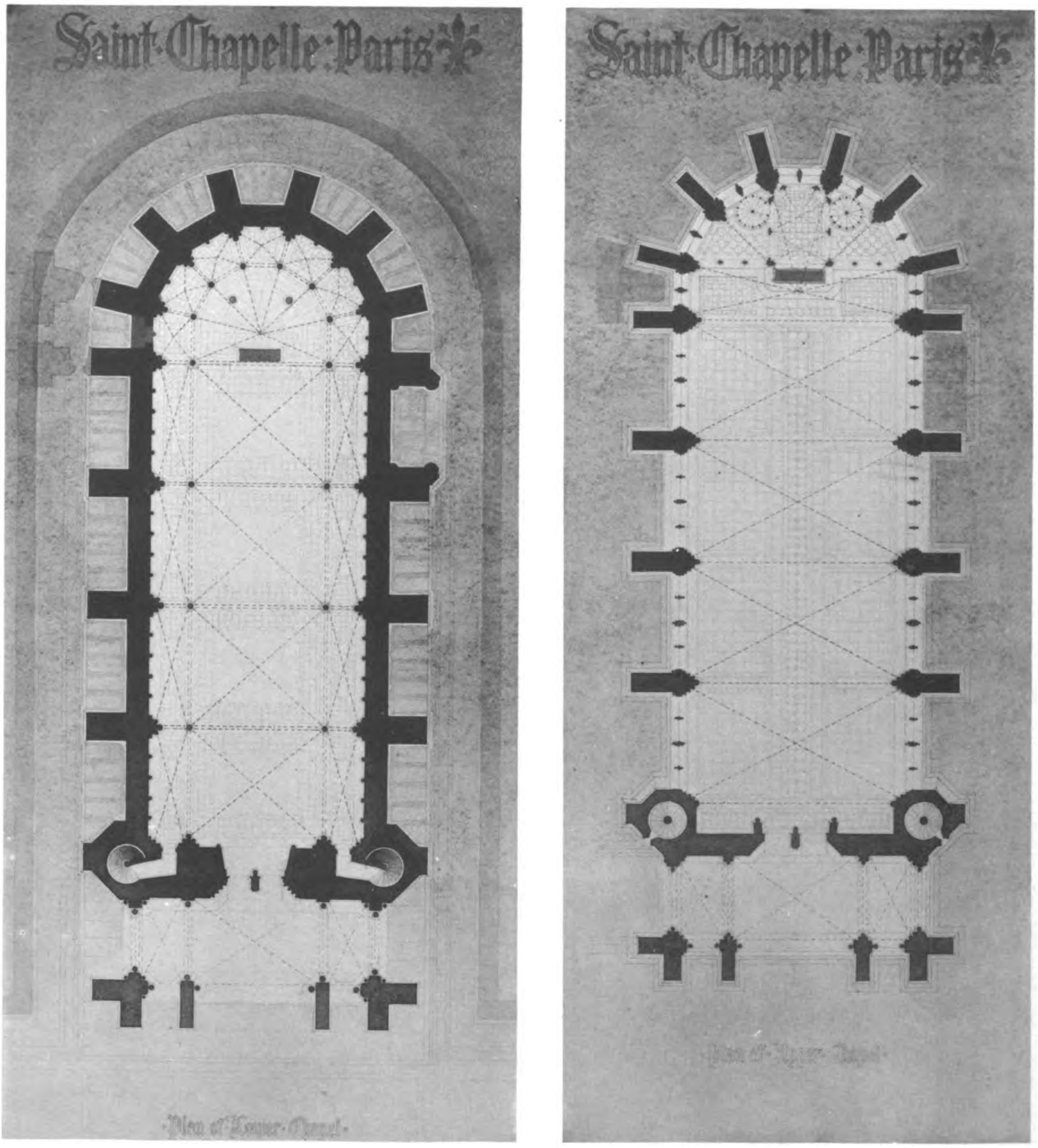
December 1912



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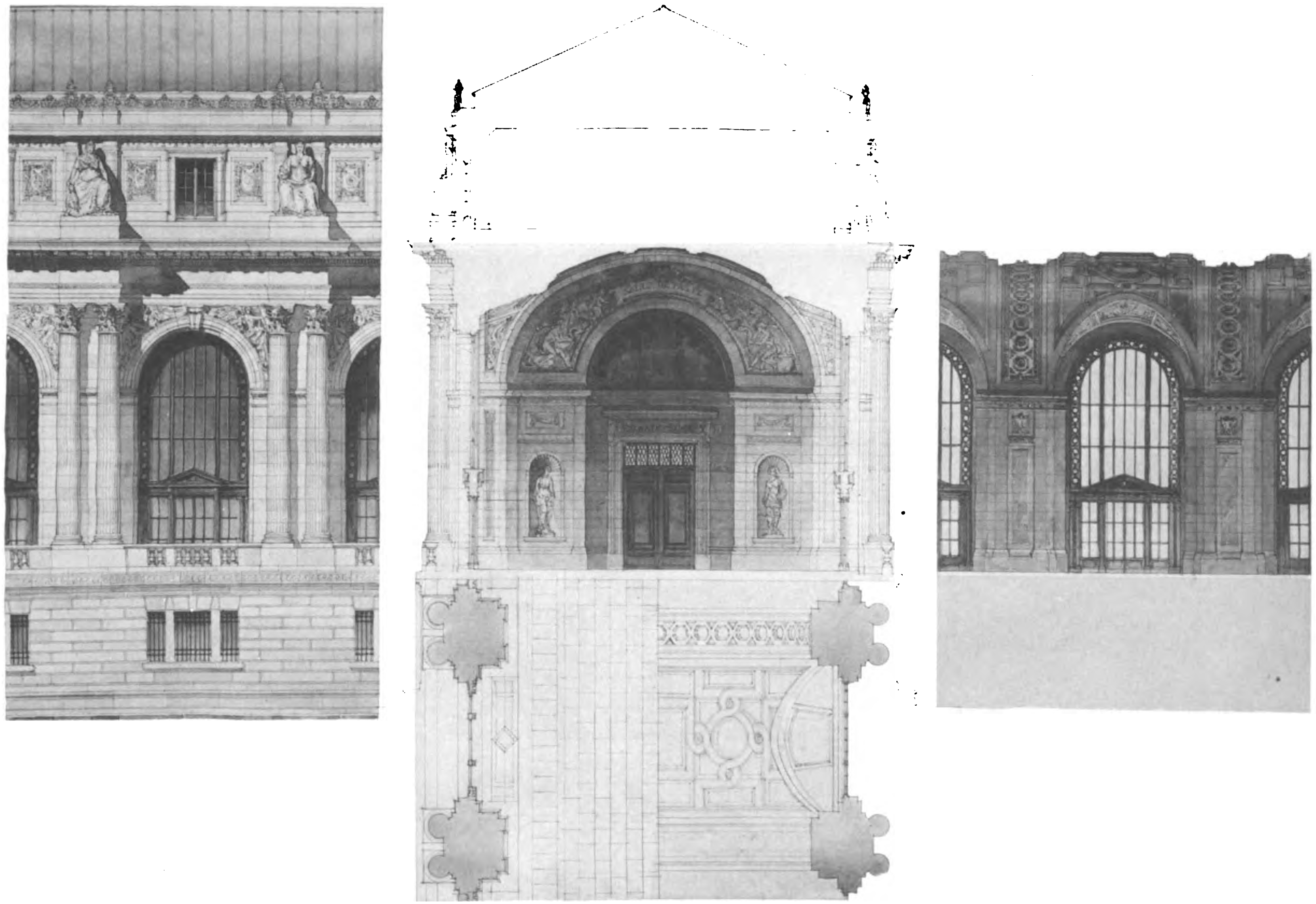
HELIOTYPE CO. BOSTON



LOBBY OF A PARLIAMENTARY PALACE

PLAN, SECTIONS AND ELEVATION

PRIZE IN BOSTON SOCIETY OF ARCHITECTS' COMPETITION

RALPH E. MUEHLMAN, ADVANCED DESIGN

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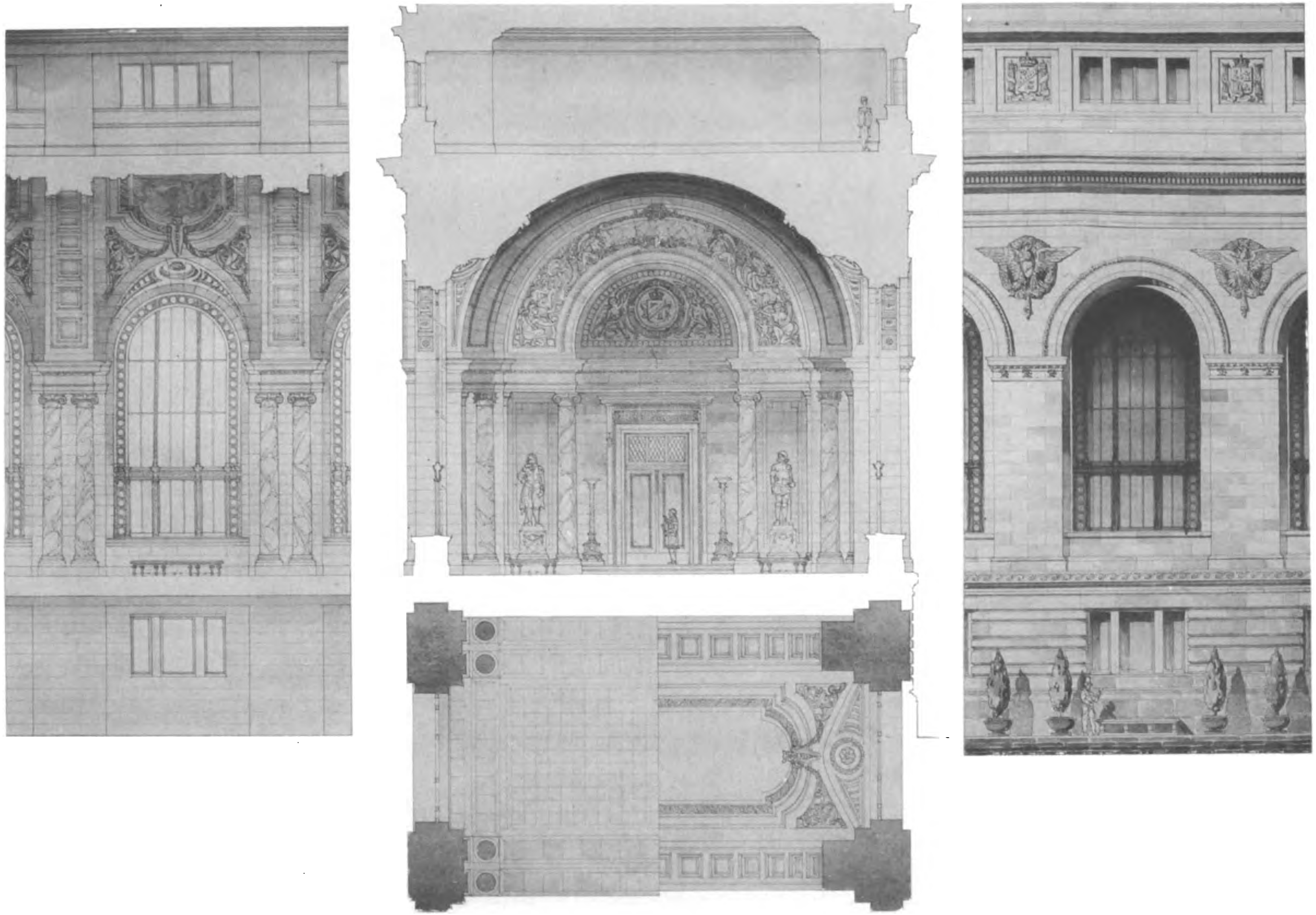

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GEORGE E. GRAVES, ADVANCED DESIGN

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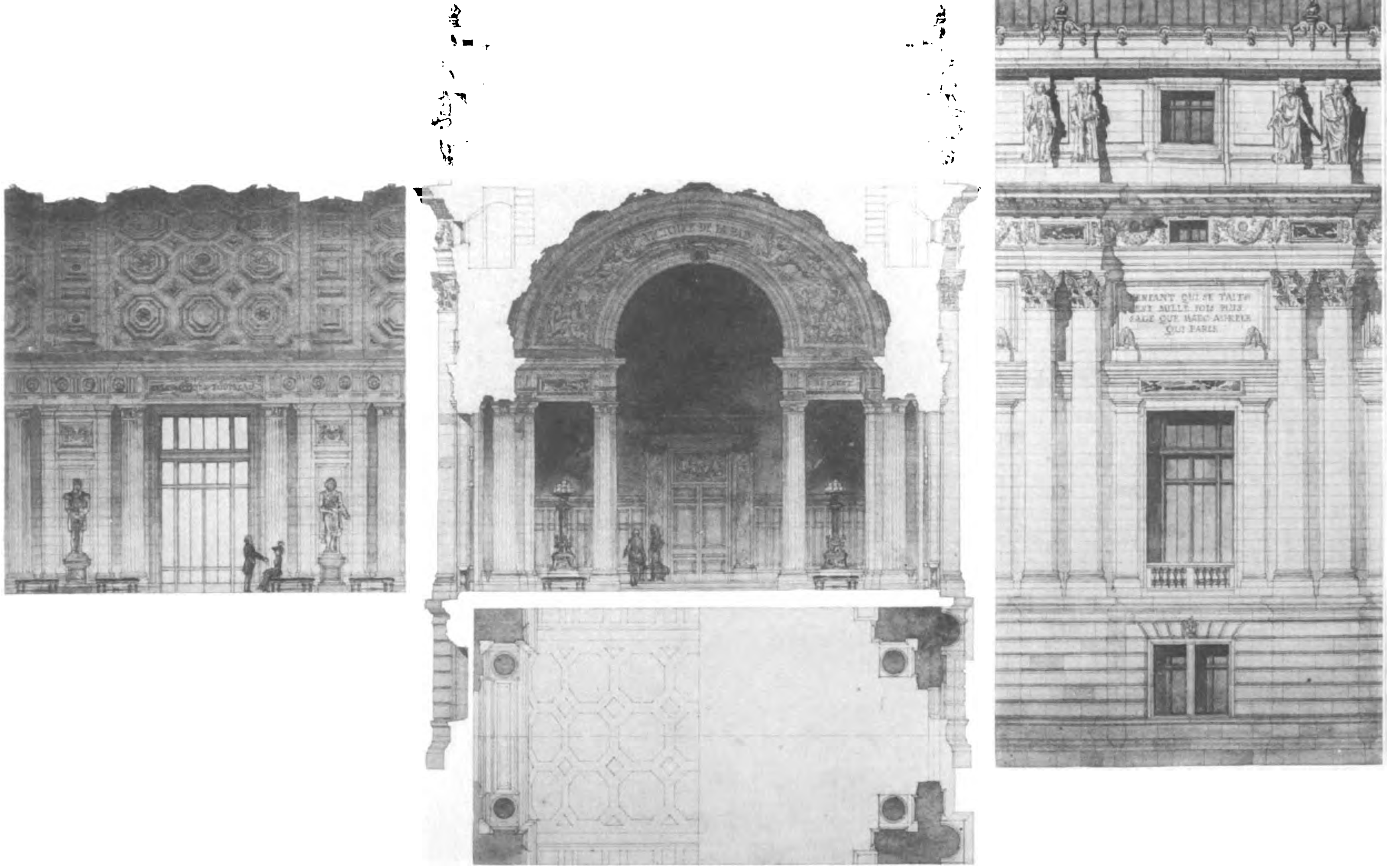

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HOWARD MOISE, ADVANCED DESIGN

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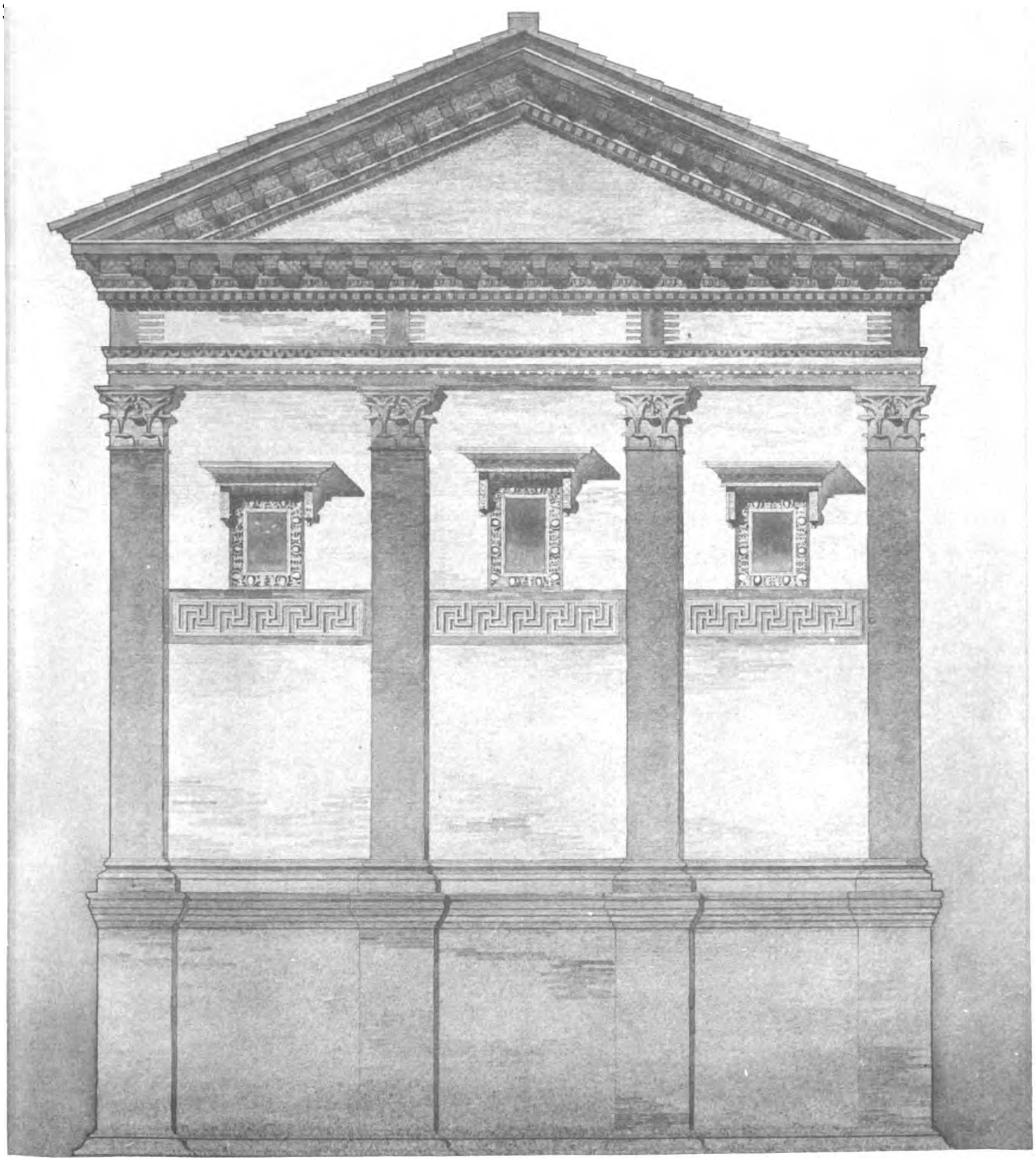

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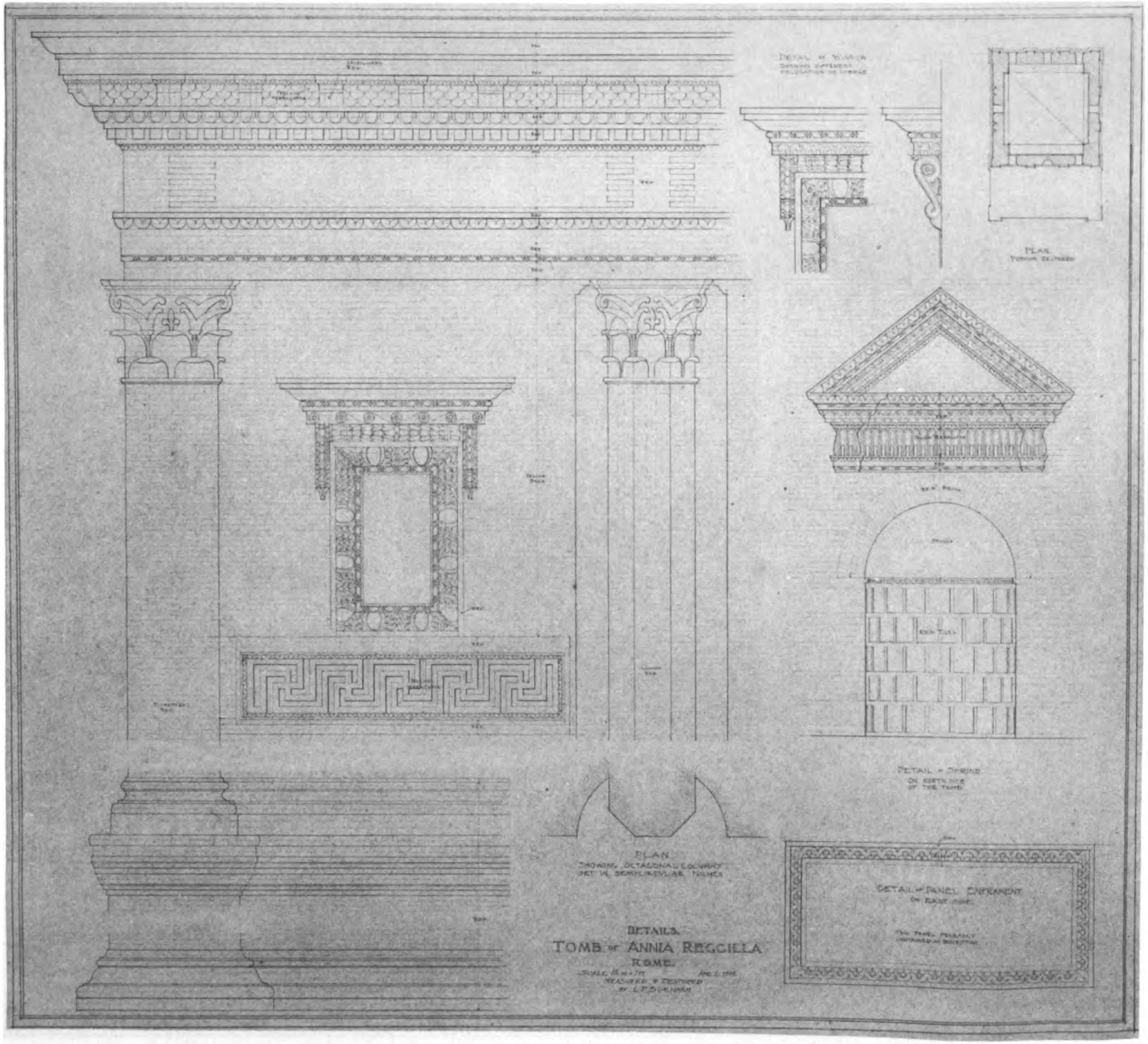

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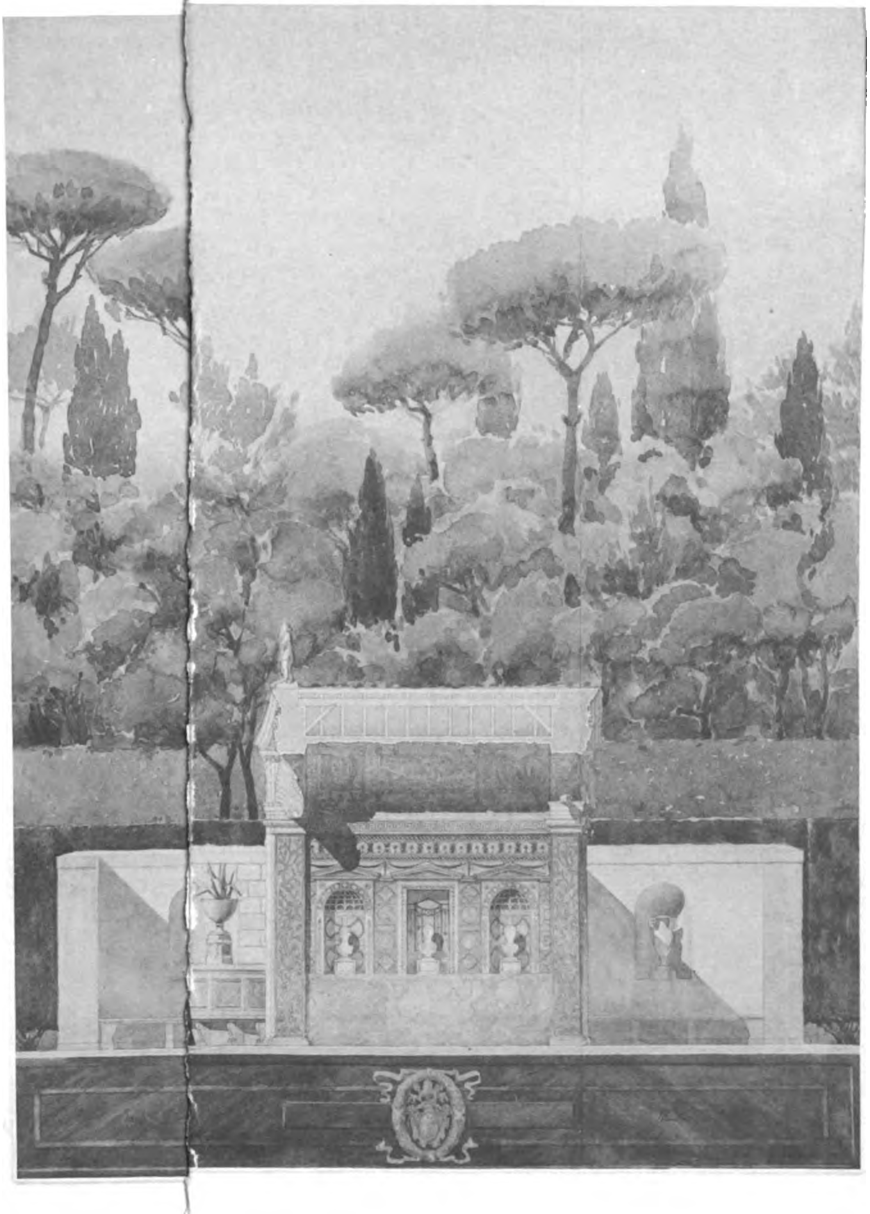
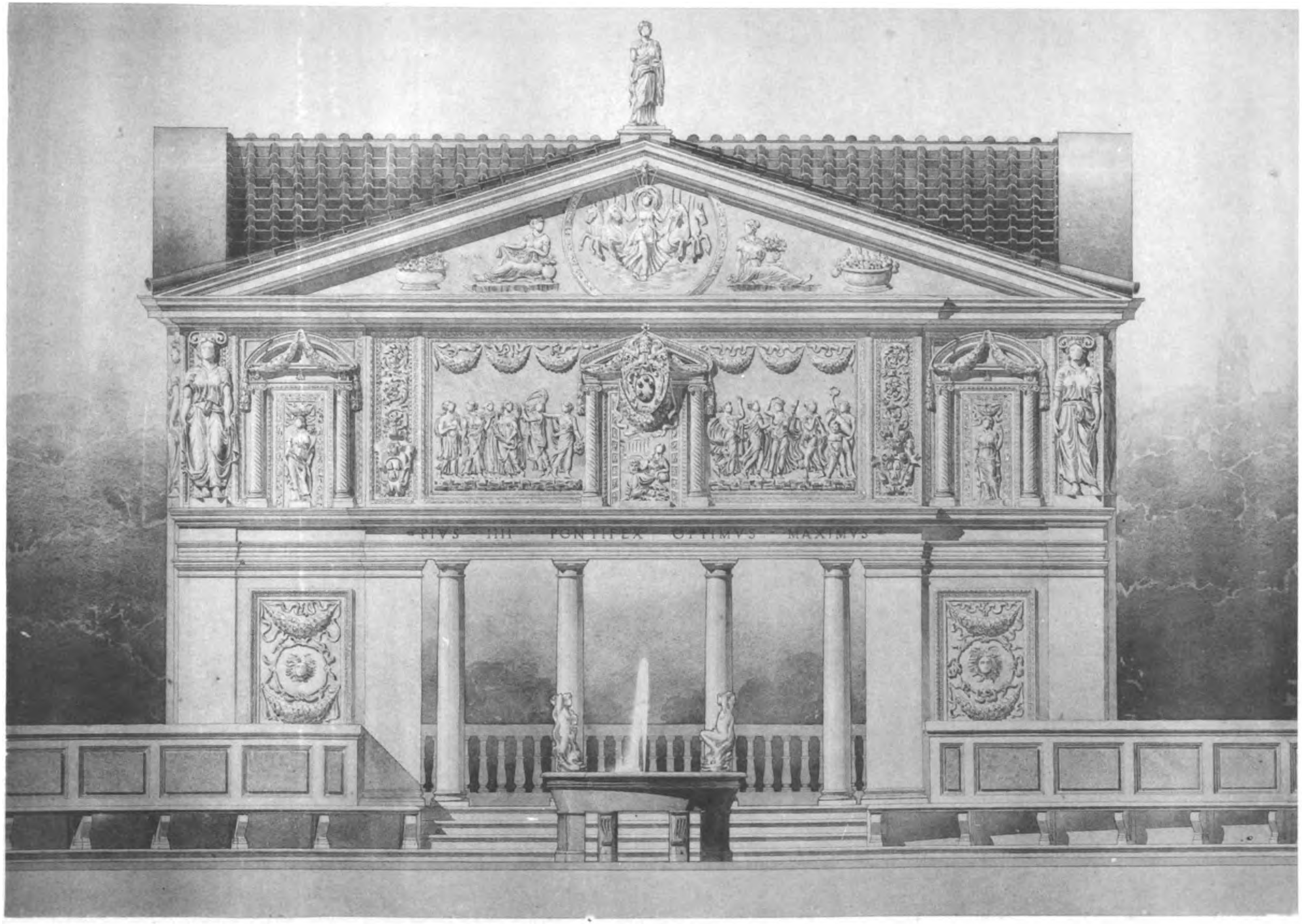


Arch



VILLA PIA, ROME
MAURICE FEATHER S. M. IN ARCHITECTURE
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